

# ***47' MOTOR LIFEBOAT***

## ***VESSEL SYSTEMS***

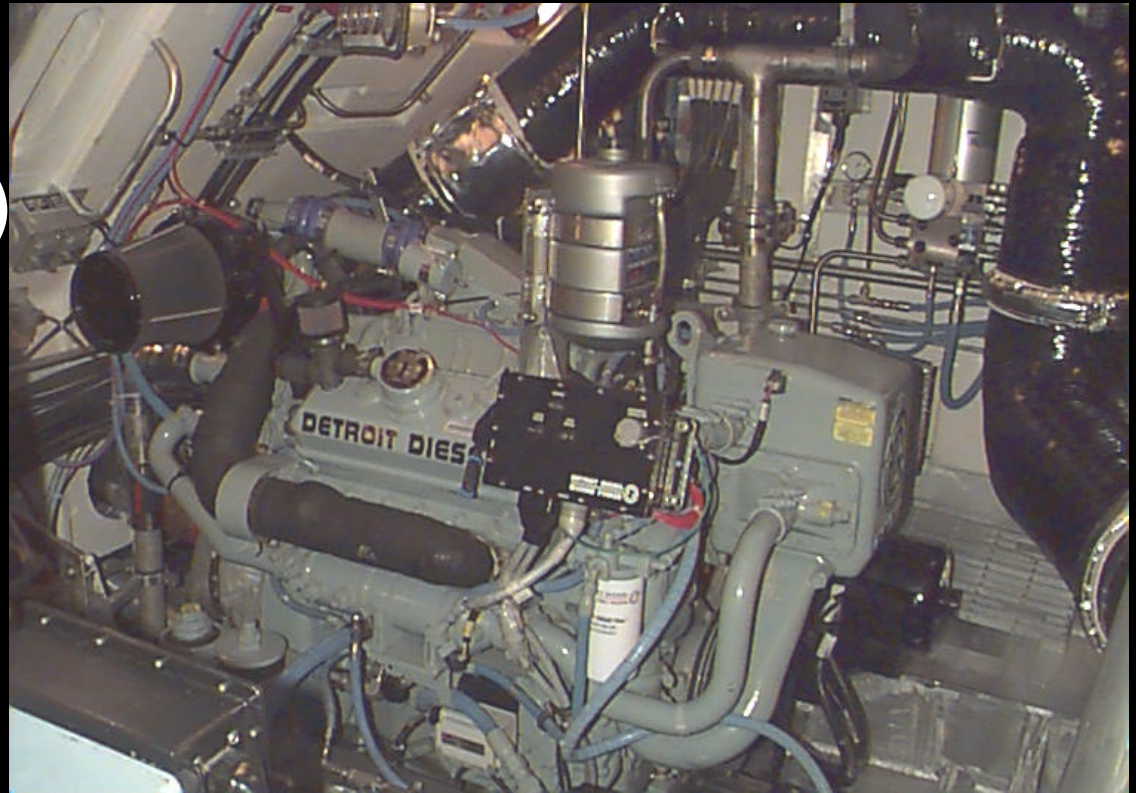


# Vessel Systems Include:

- ◆ 6V92TA Engine
- ◆ Raw Water System
- ◆ Engine Jacket Water System
- ◆ Engine Lube Oil System
- ◆ Fuel Oil System
- ◆ DDEC Engine System
- ◆ DDEC Vessel Components
- ◆ Reintjes Gear
- ◆ Hydraulic Steering
- ◆ CO2 Fire Suppression
- ◆ Electrical System
- ◆ Dewatering System
- ◆ Emergency Window Release System

# 6V92TA Detroit Diesel Engine

- ◆ 435 HP
- ◆ 2200 RPM (max)
- ◆ DDEC Equipped
- ◆ Turbocharged
- ◆ After cooled
- ◆ Right hand Rotation



# Raw Water System

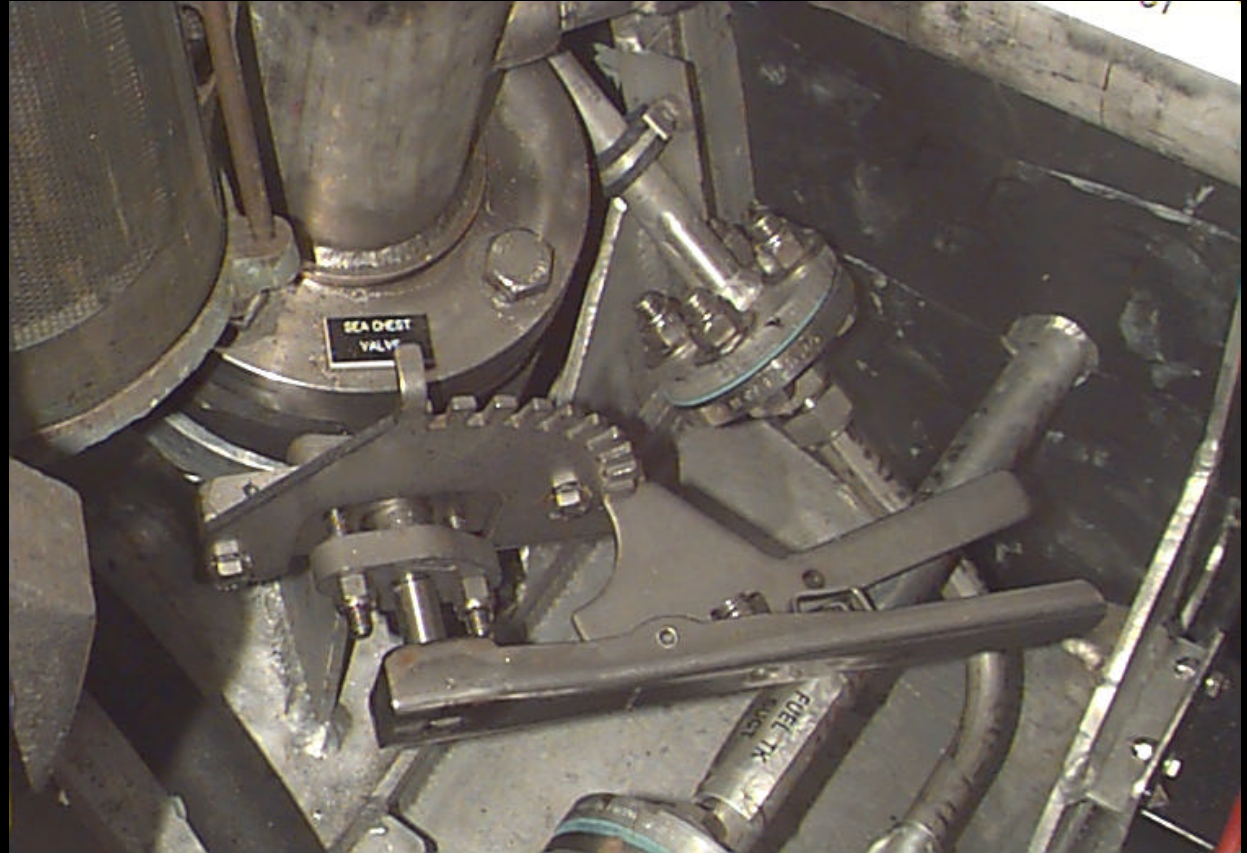


# Major Components

- ◆ Sea valve
- ◆ Sea strainers
- ◆ R/W pump
- ◆ F/O cooler
- ◆ Heat exchanger
- ◆ Restrictor plate
- ◆ Deicing valves
- ◆ Drip less shaft seal
- ◆ R/G oil cooler
- ◆ Steering system cooler
- ◆ Muffler

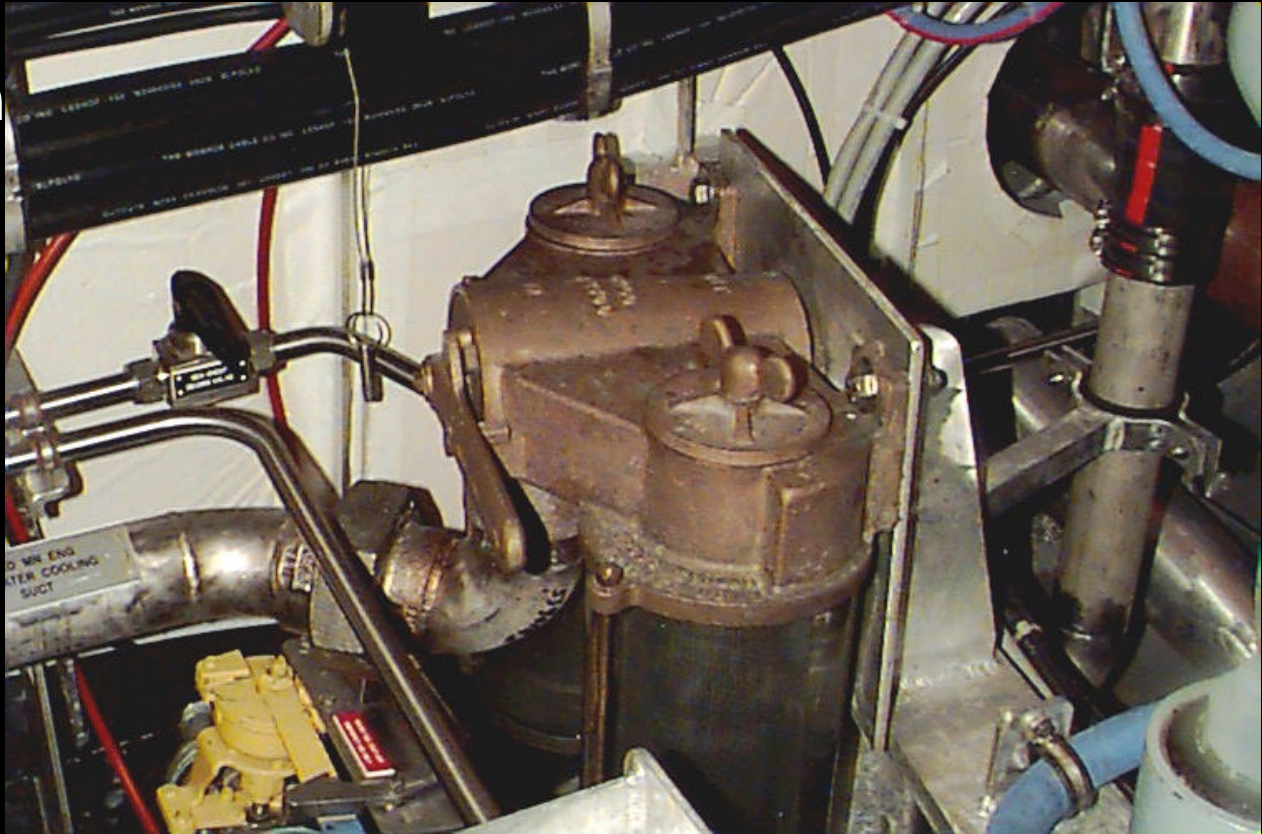
# Sea Valve

- ◆ Butterfly valve
- ◆ Stainless steel body



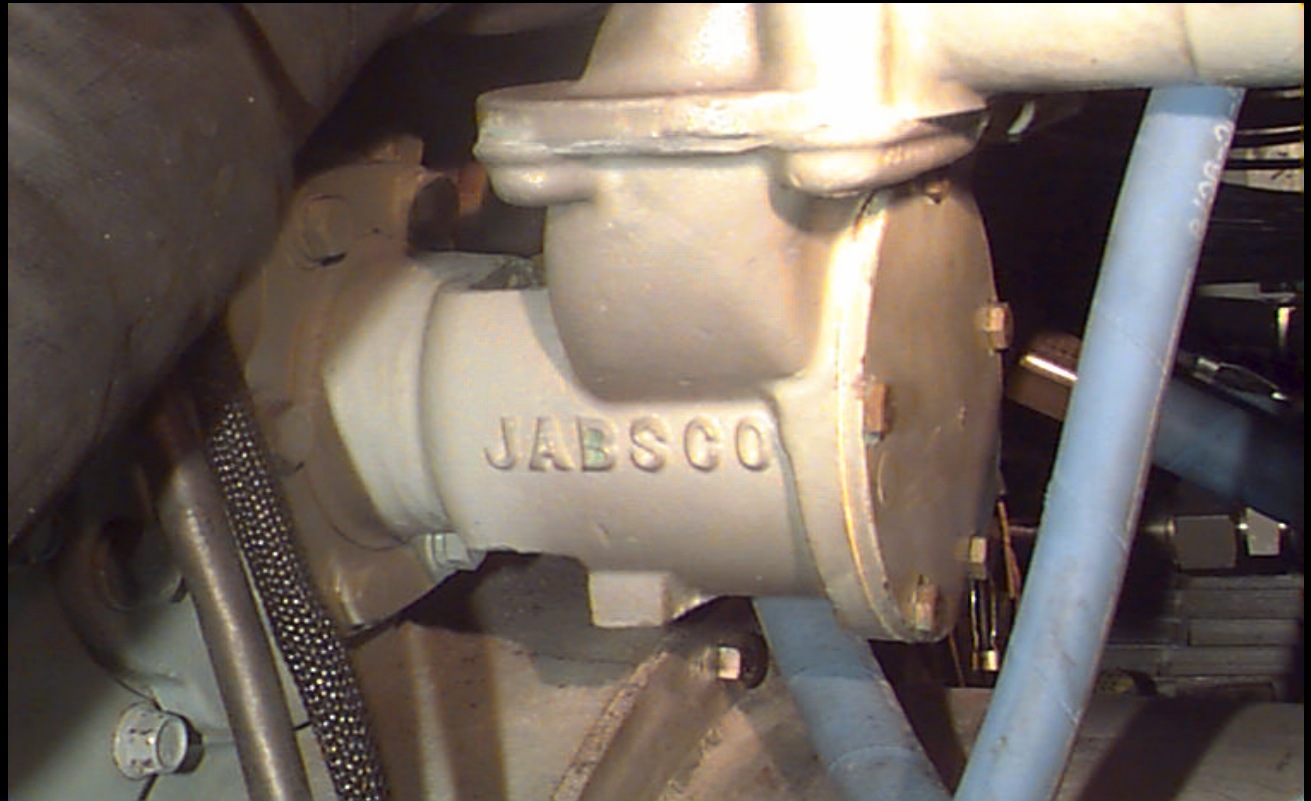
# Sea Strainer

- ◆ Vertical duplex bronze strainer
- ◆ Plexiglass viewing cylinders
- ◆ 4" monel strainer basket



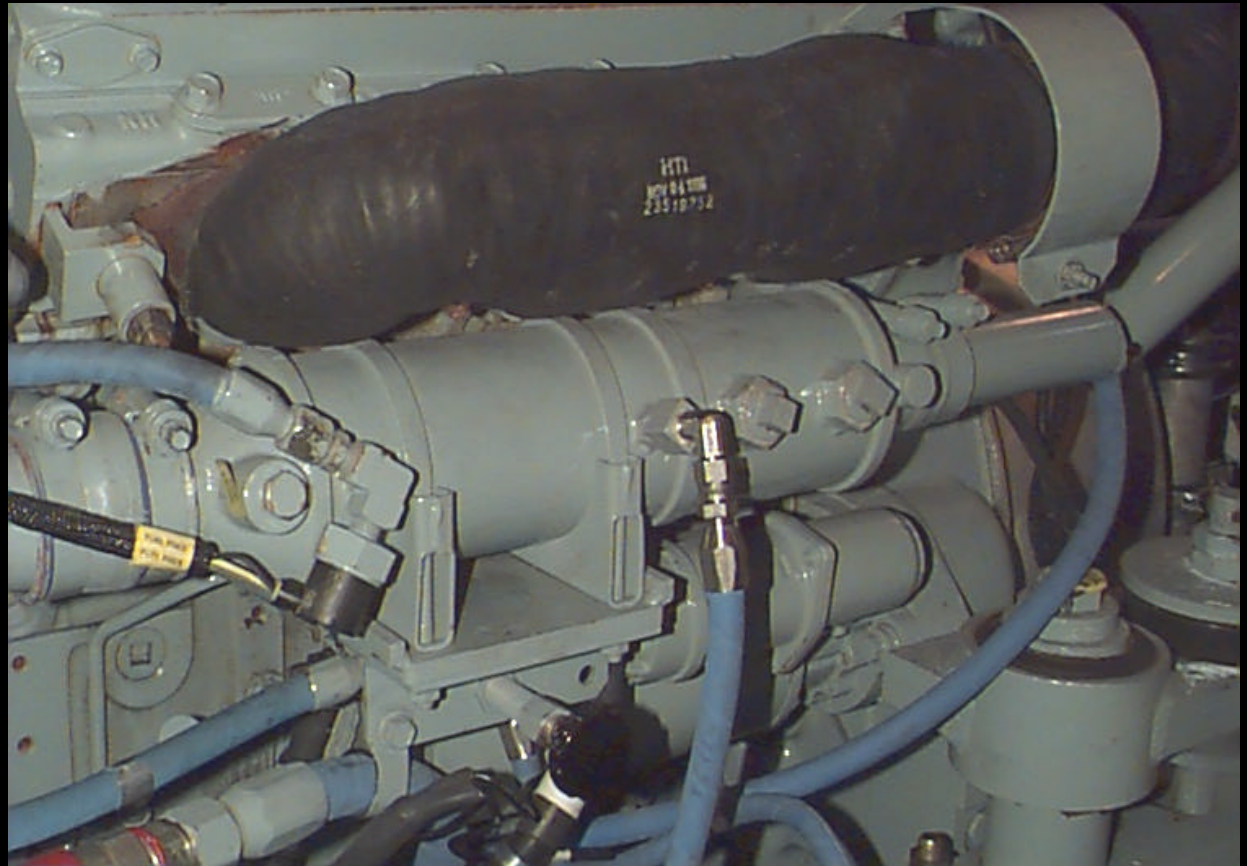
# R/W Pump

- ◆ Jabsco pump
- ◆ 67 gpm

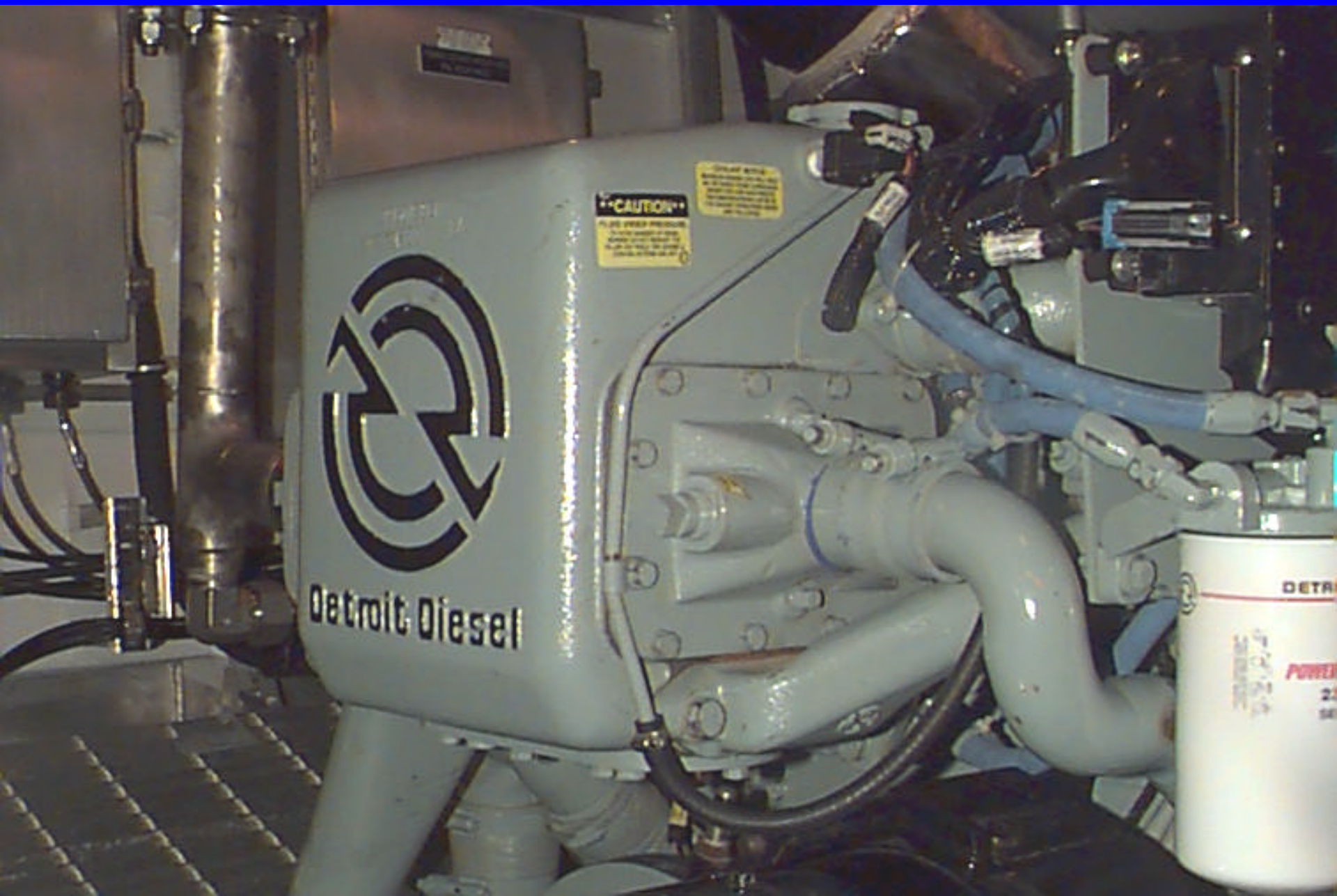


# Fuel Cooler

- ◆ Cools fuel returning to tank
- ◆ Maintains fuel temp. below 90 deg. F

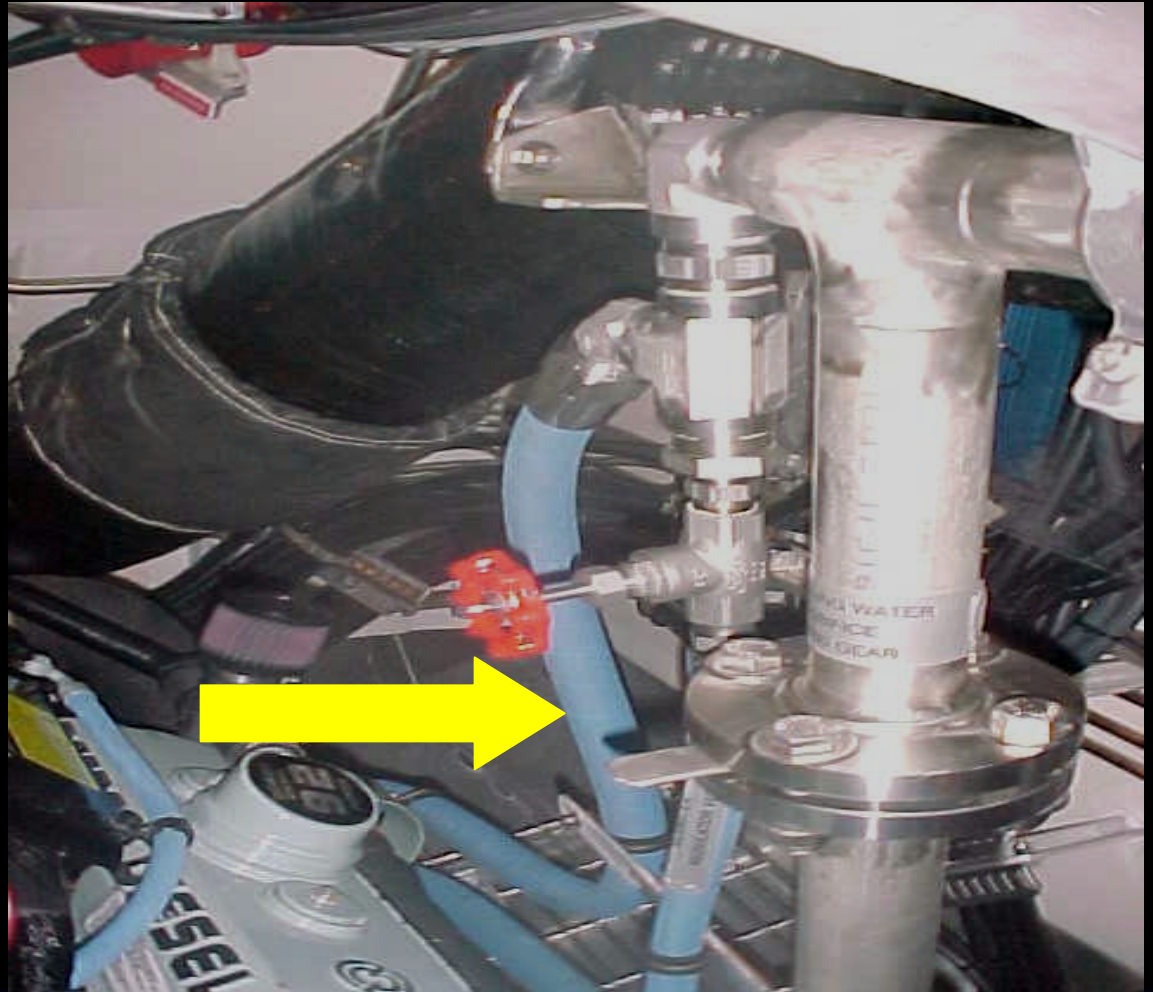


# Heat Exchanger

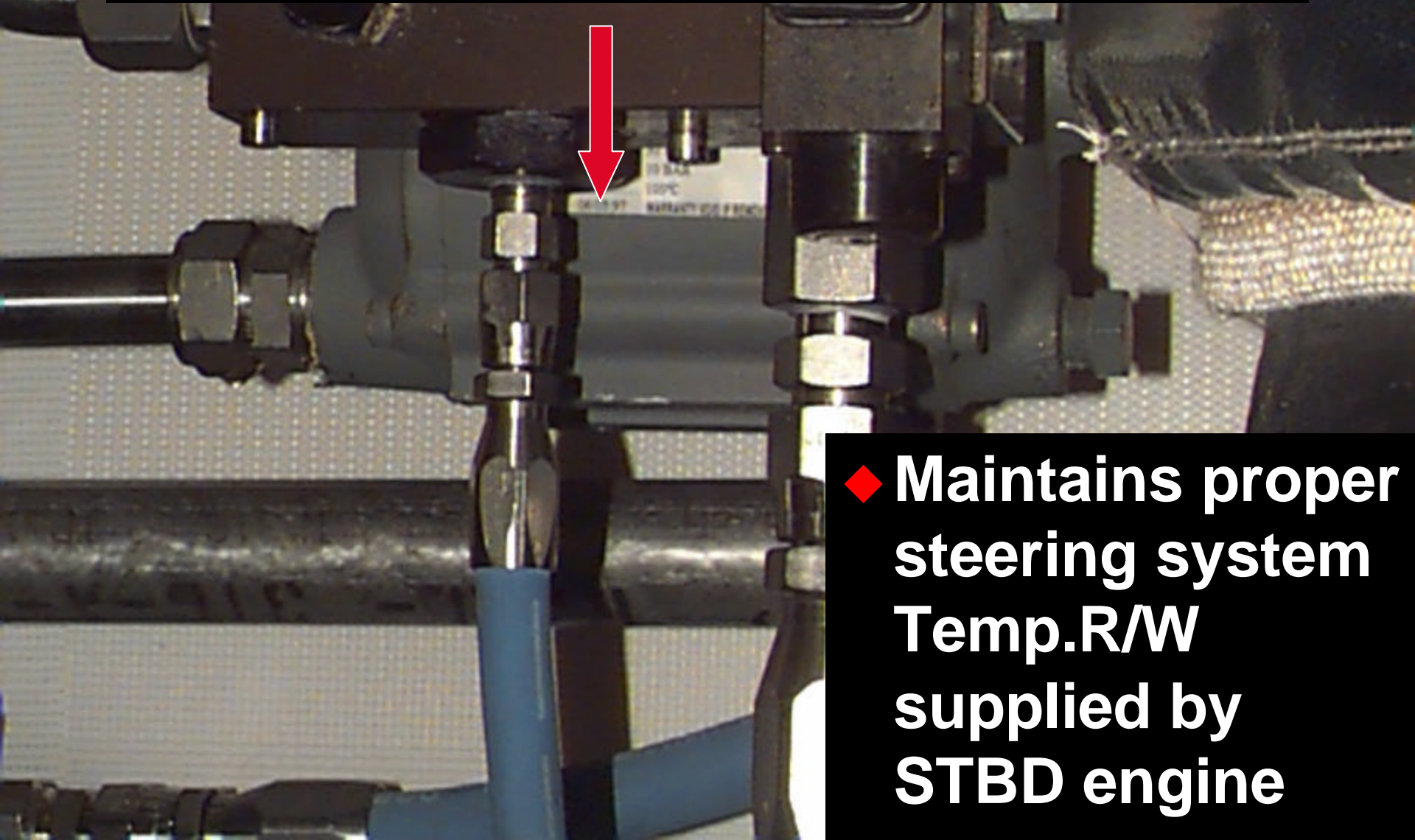


# Restrictor Plate

- ◆ 1 inch opening
- ◆ Diverts flow fwd to R/G



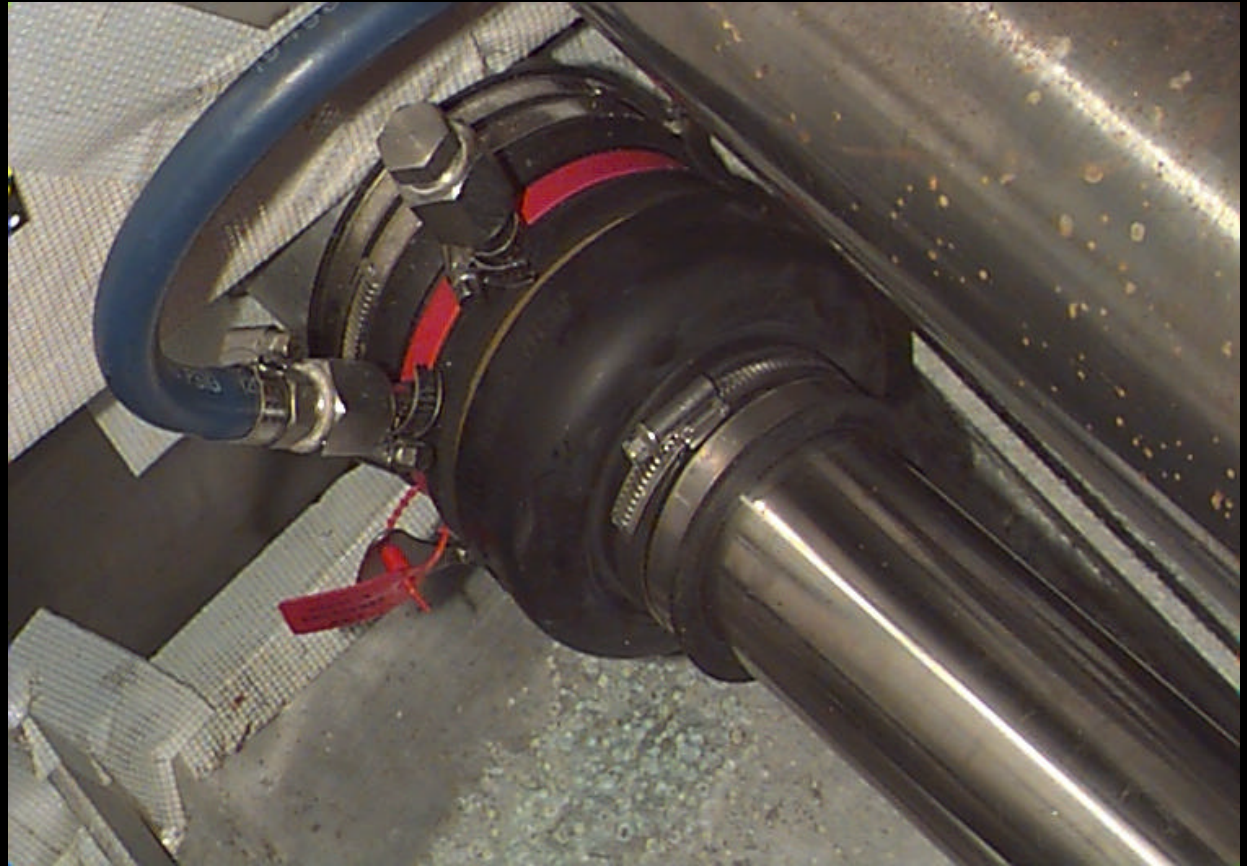
# Steering System Cooler



- ◆ Maintains proper steering system Temp.R/W supplied by STBD engine

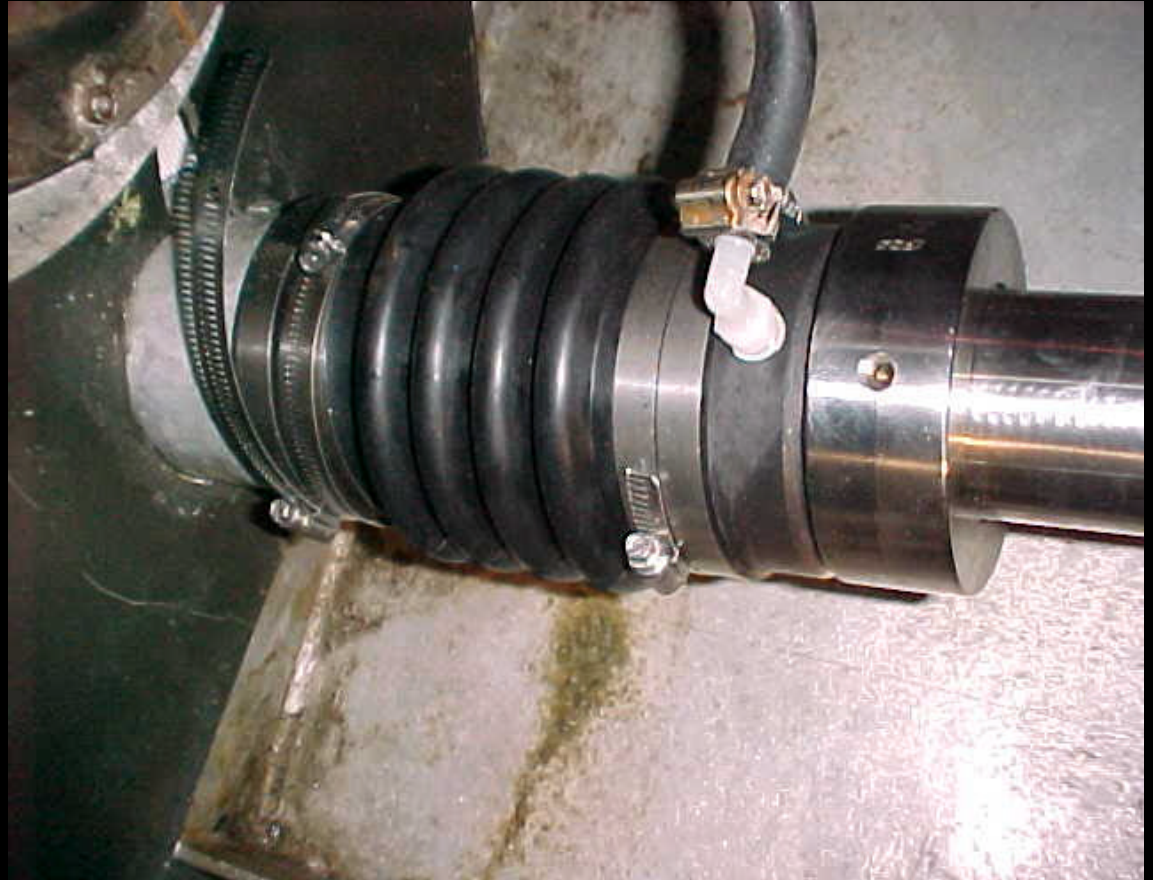
# Shaft Seal

- ◆ Raw Water provides flushing and cooling

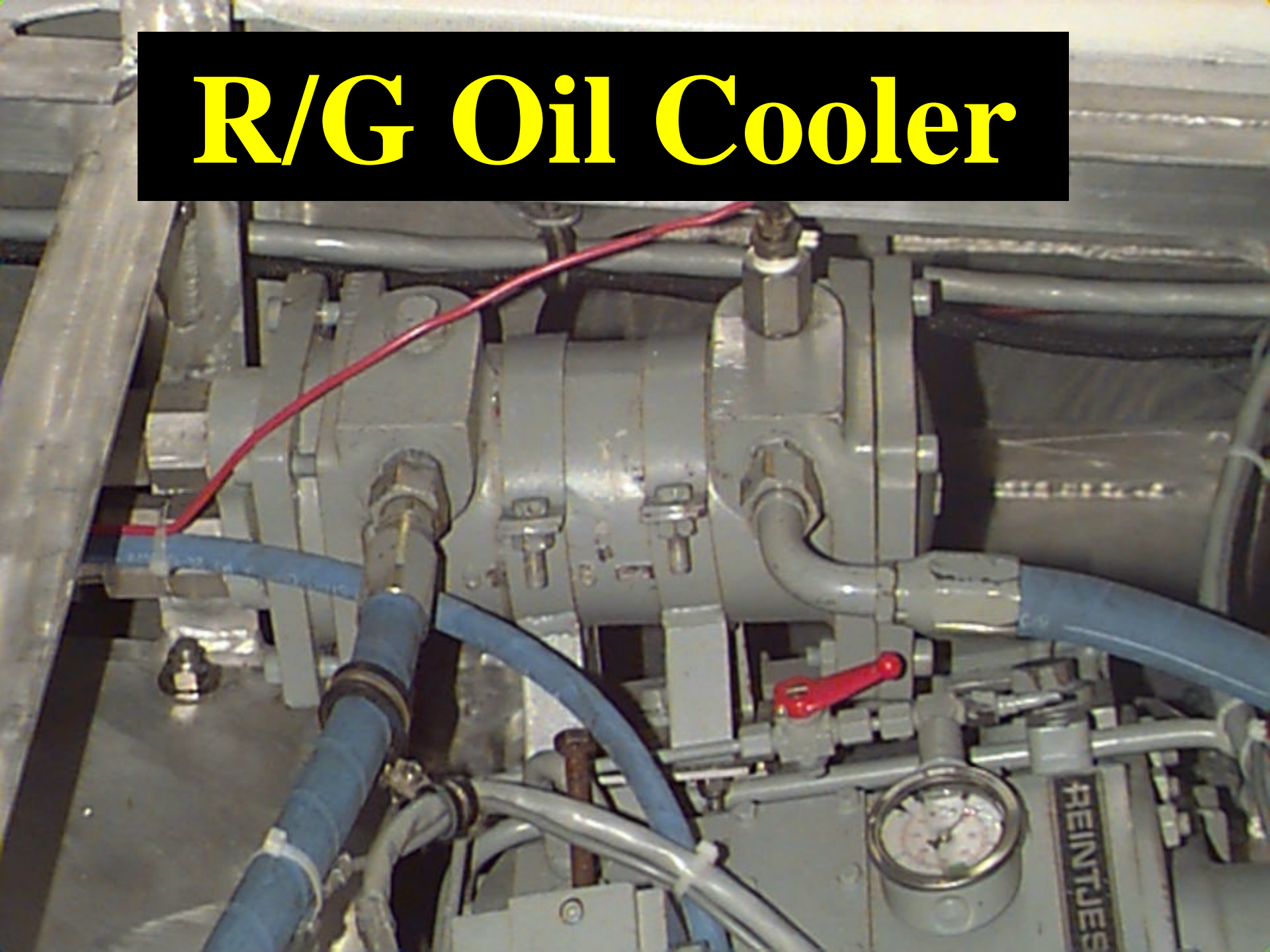


# Shaft Seal

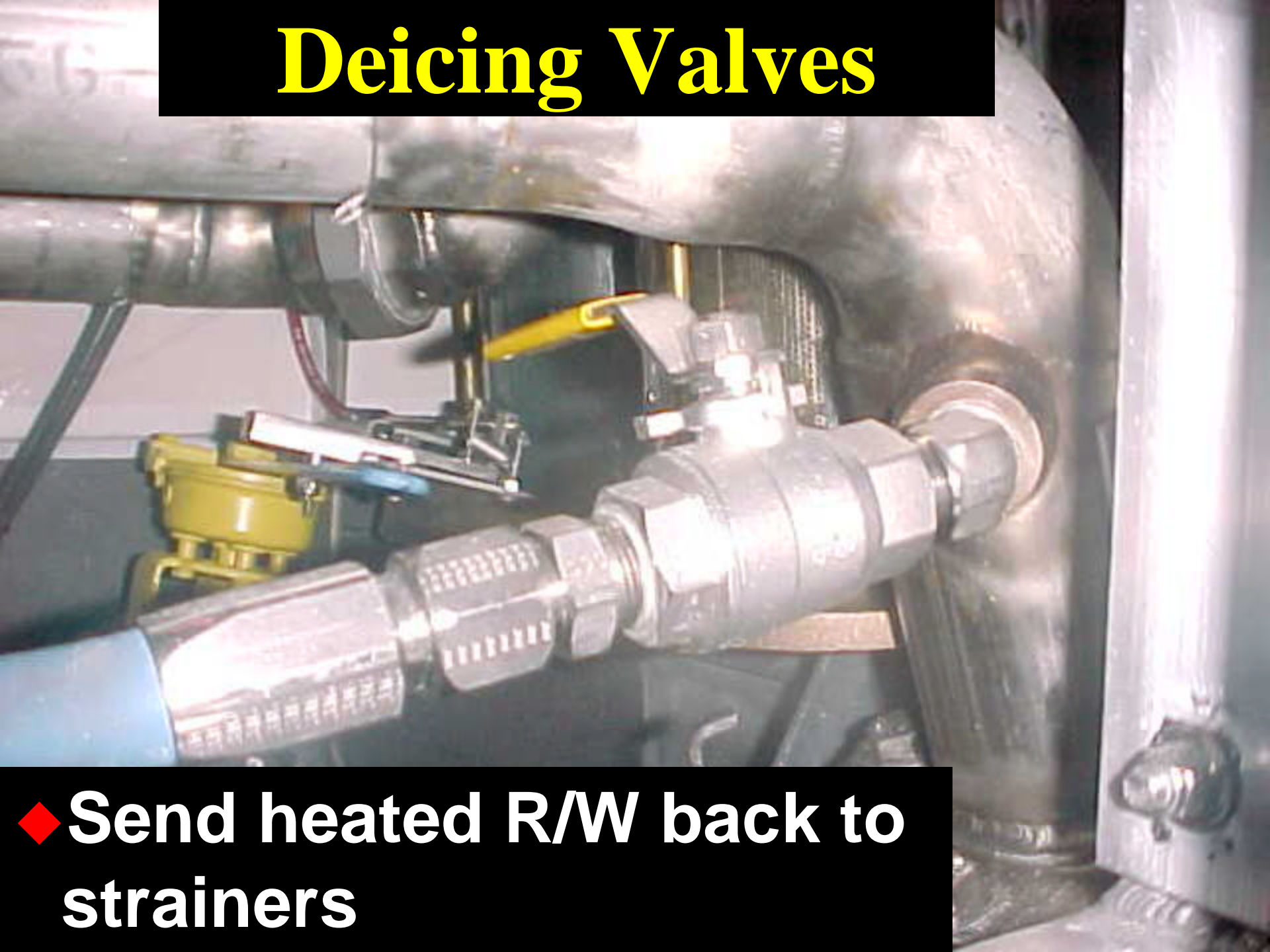
- ◆ Raw Water provides flushing and cooling



# R/G Oil Cooler



# Deicing Valves



◆ Send heated R/W back to strainers

# Muffler

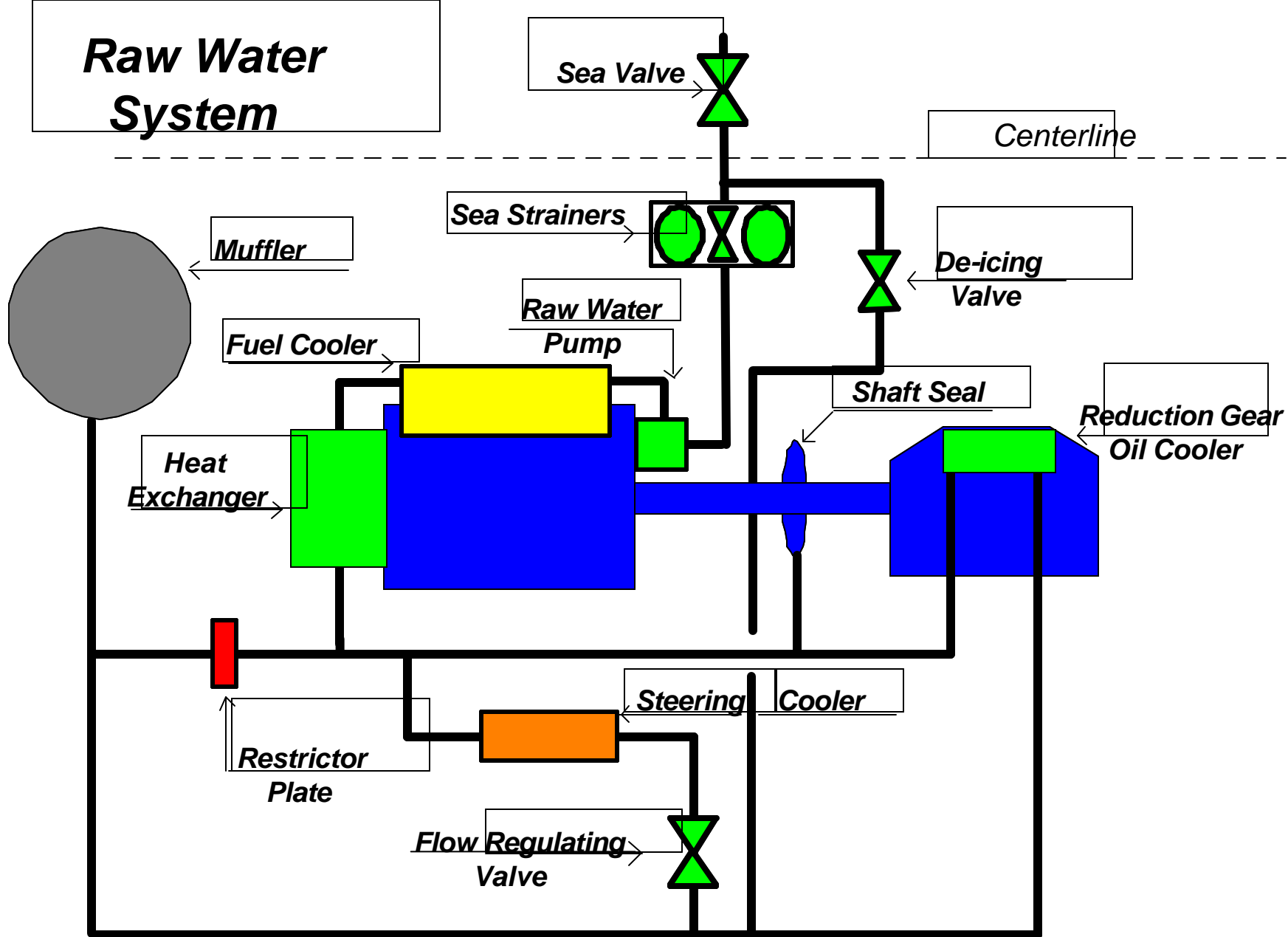
A photograph of a boat's engine compartment. The central feature is a large, vertical, cylindrical stainless steel muffler. To its left, a black, horizontal, conical-shaped component is labeled 'Overboard'. To the right, a horizontal pipe with a 90-degree elbow is labeled 'Cross over'. At the bottom, a black pipe leading from the engine is labeled 'From Engine'. The background shows various mechanical parts, hoses, and a red warning label with the letters 'WA' and the text 'WHILE EVACUATE CARBON DIOXIDE'.

Cross  
over

Overboard

From Engine

# Raw Water System

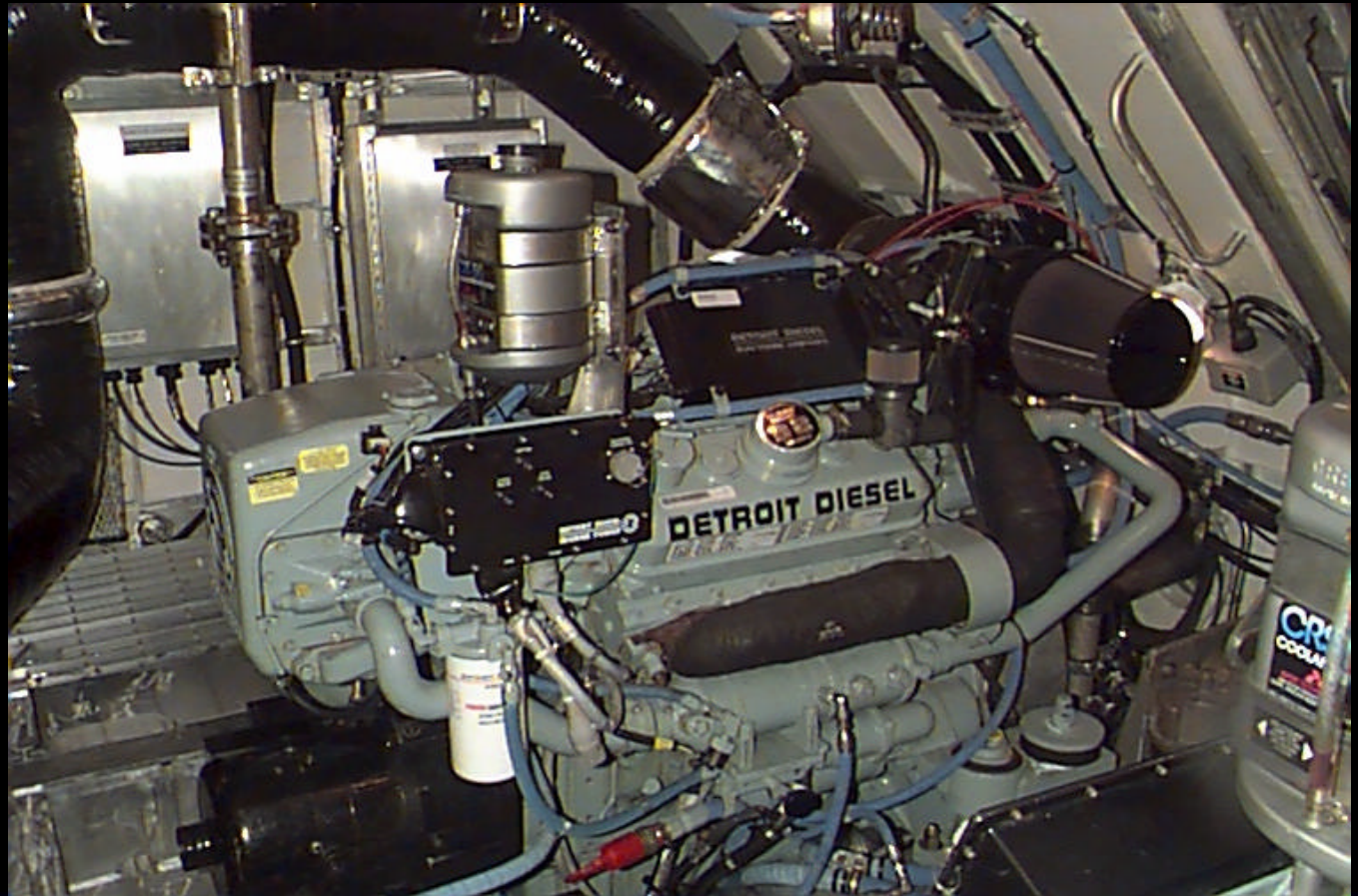


# Engine Jacket Water System



# Jacket Water System

- ◆ 12 Gallon Capacity
- ◆ Temp. Range of 160 - 205 deg. F



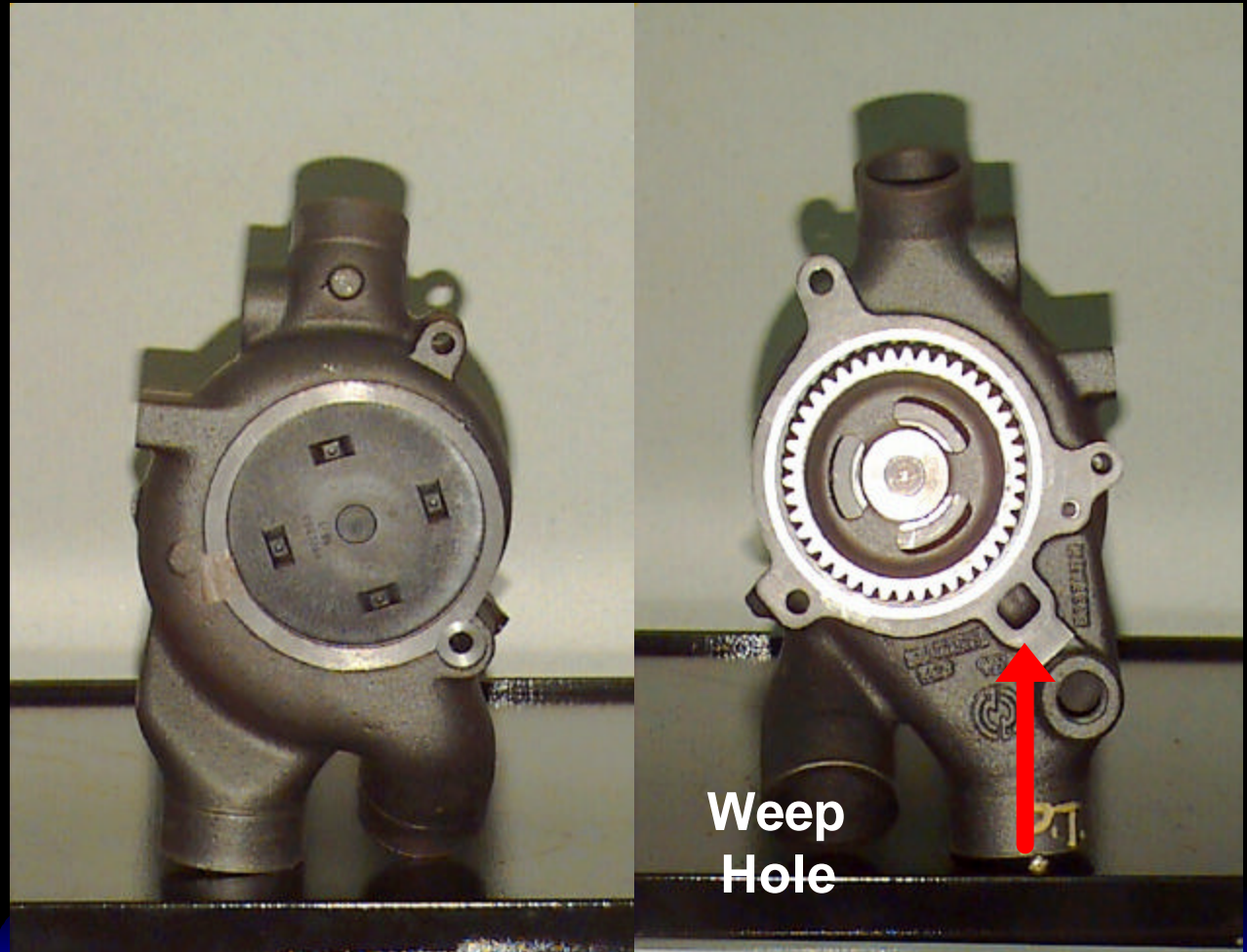
# Coolant Recovery Bottle

◆ 1  
gallon  
capacity

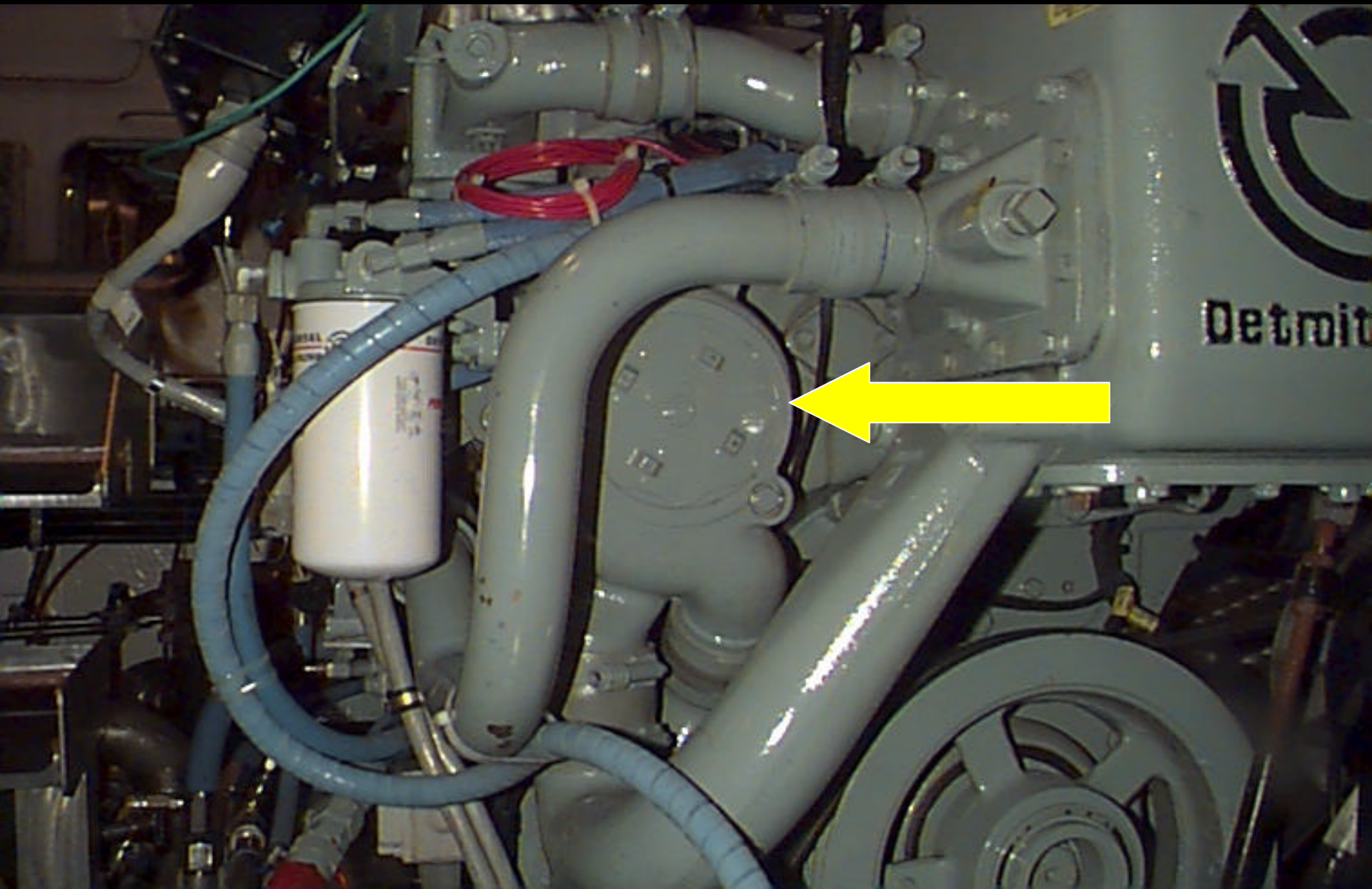


# Jacket Water Pump

- ◆ Driven off the right bank front cam gear
- ◆ 160 GPM



# J/W Pump

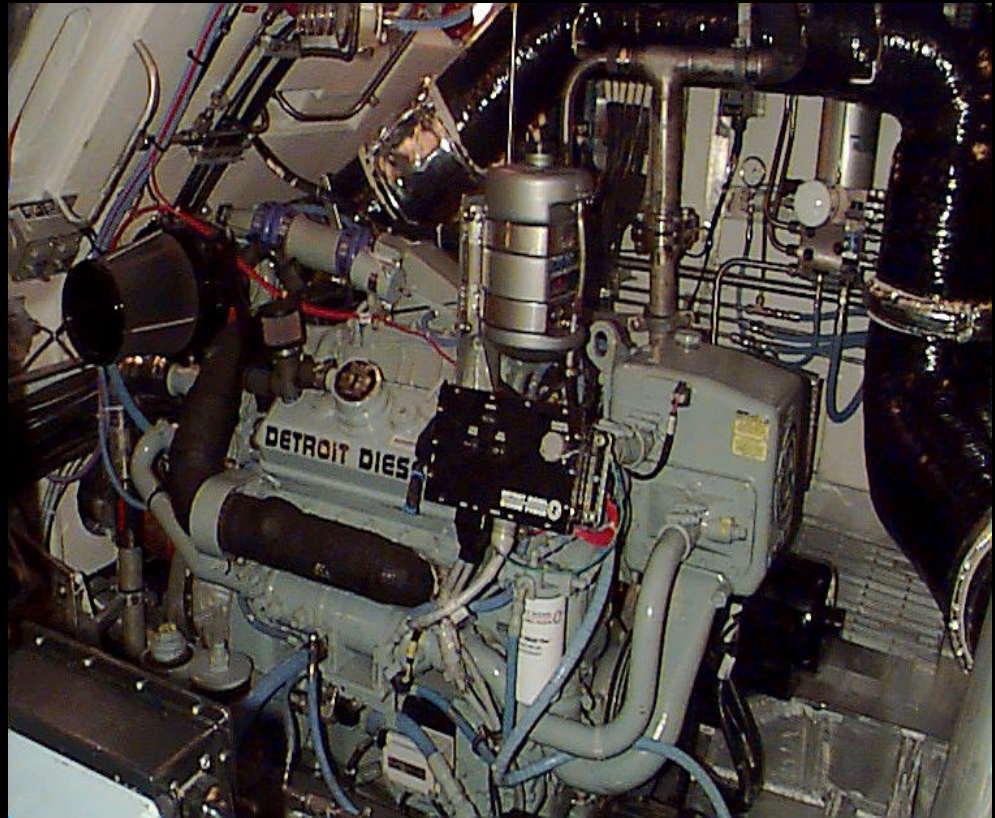


# Engine Lube Oil System



# Characteristics

- ◆ 40 WT Oil
- ◆ 5.5 Gal Capacity
- ◆ Dual Oil Pumps
- ◆ Oil Pressures
  - Cruising  
49 to 70 psi
  - Minimum @  
Idle 5 psi

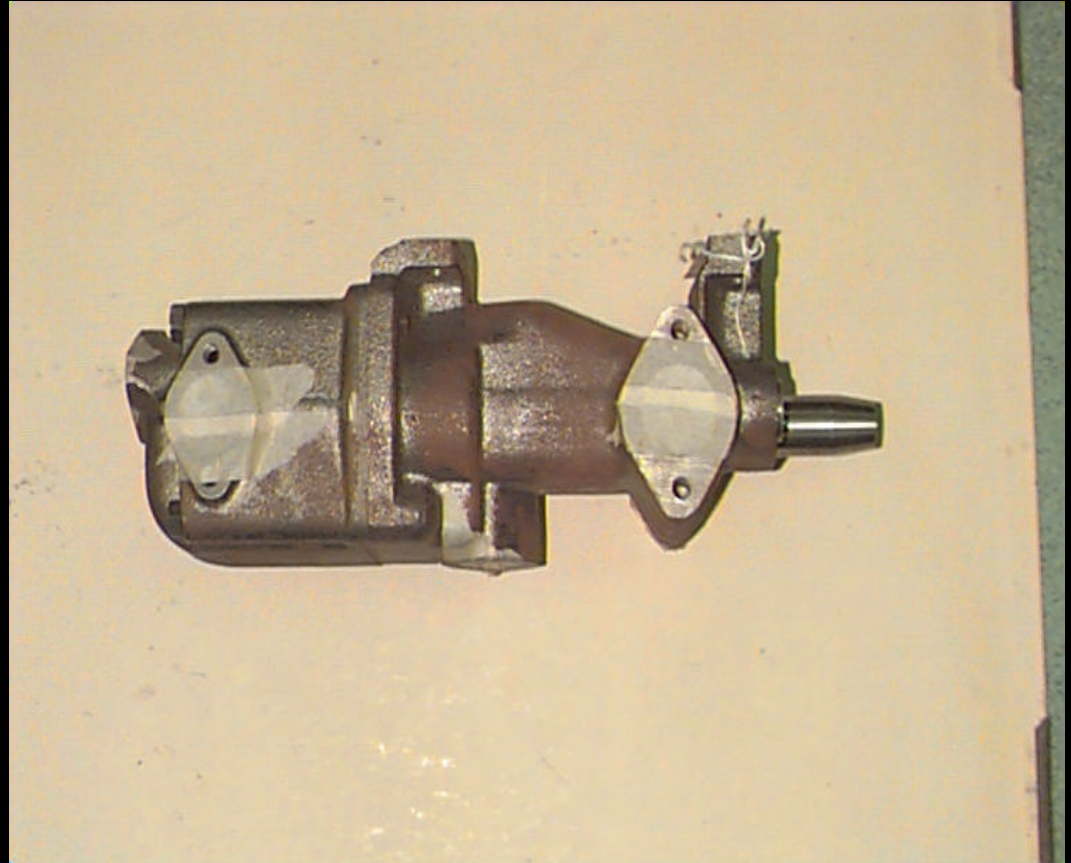


# Lube Oil Pump

## ◆ Dual pump system

- Scavenging pump
- Oil pump

## ◆ 37 GPM rating



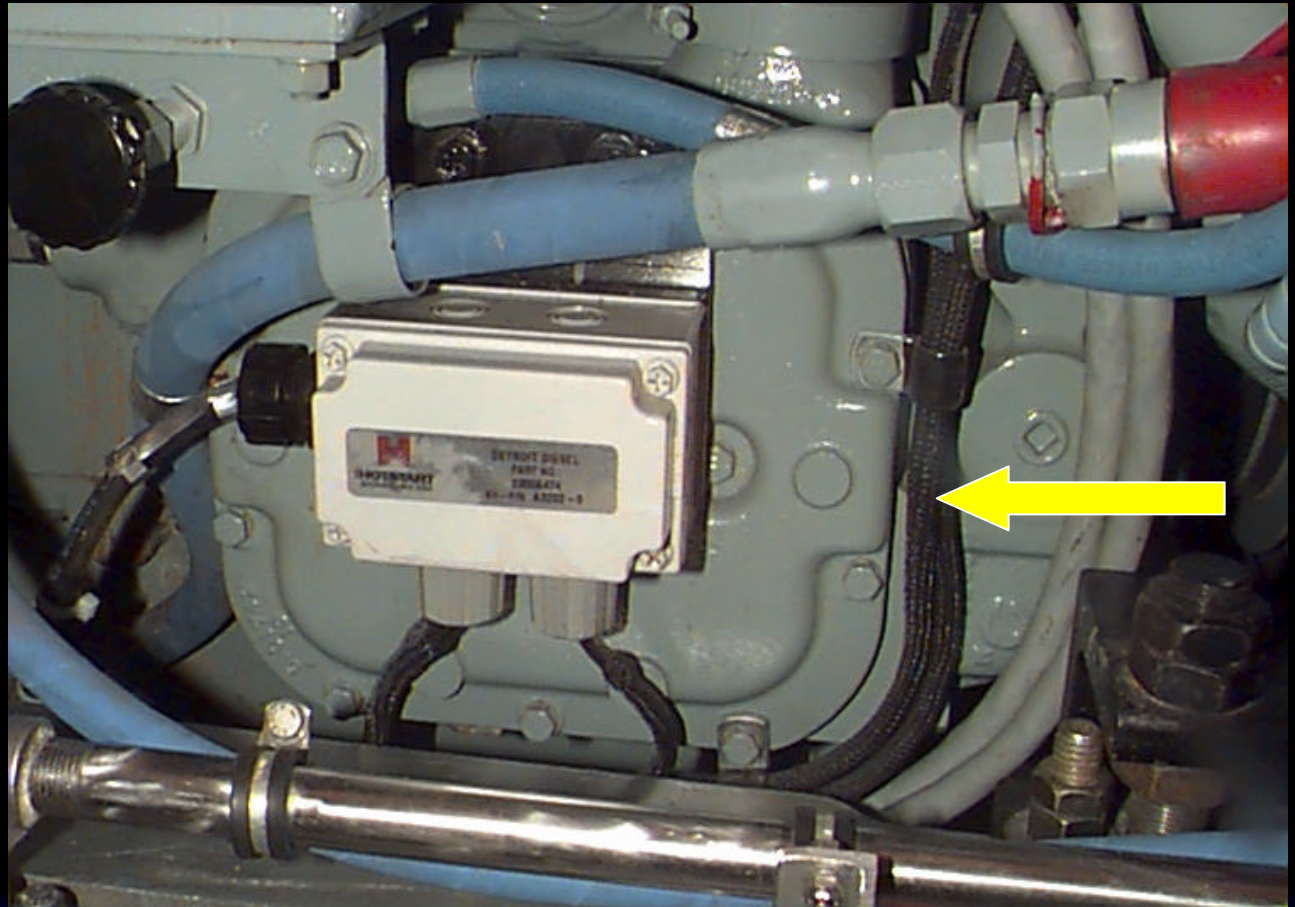
# Lube Oil Filter

- ◆ Remote Location
- ◆ Simplex Spin On

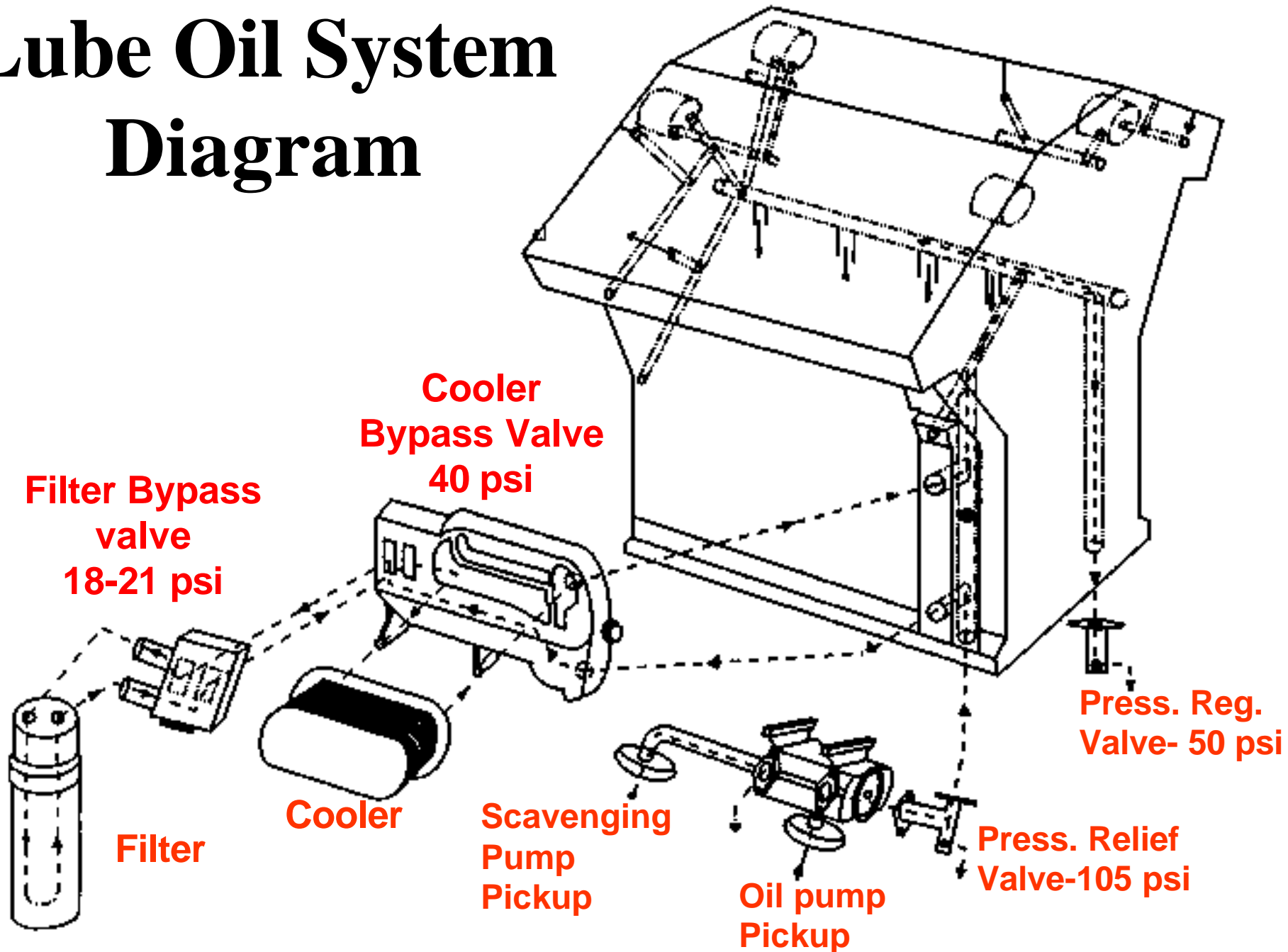


# Lube Oil Cooler

- ◆ J/W Cooled
- ◆ Maintains oil temp. between 200 and 250 deg. F



# Lube Oil System Diagram



# Fuel Oil System



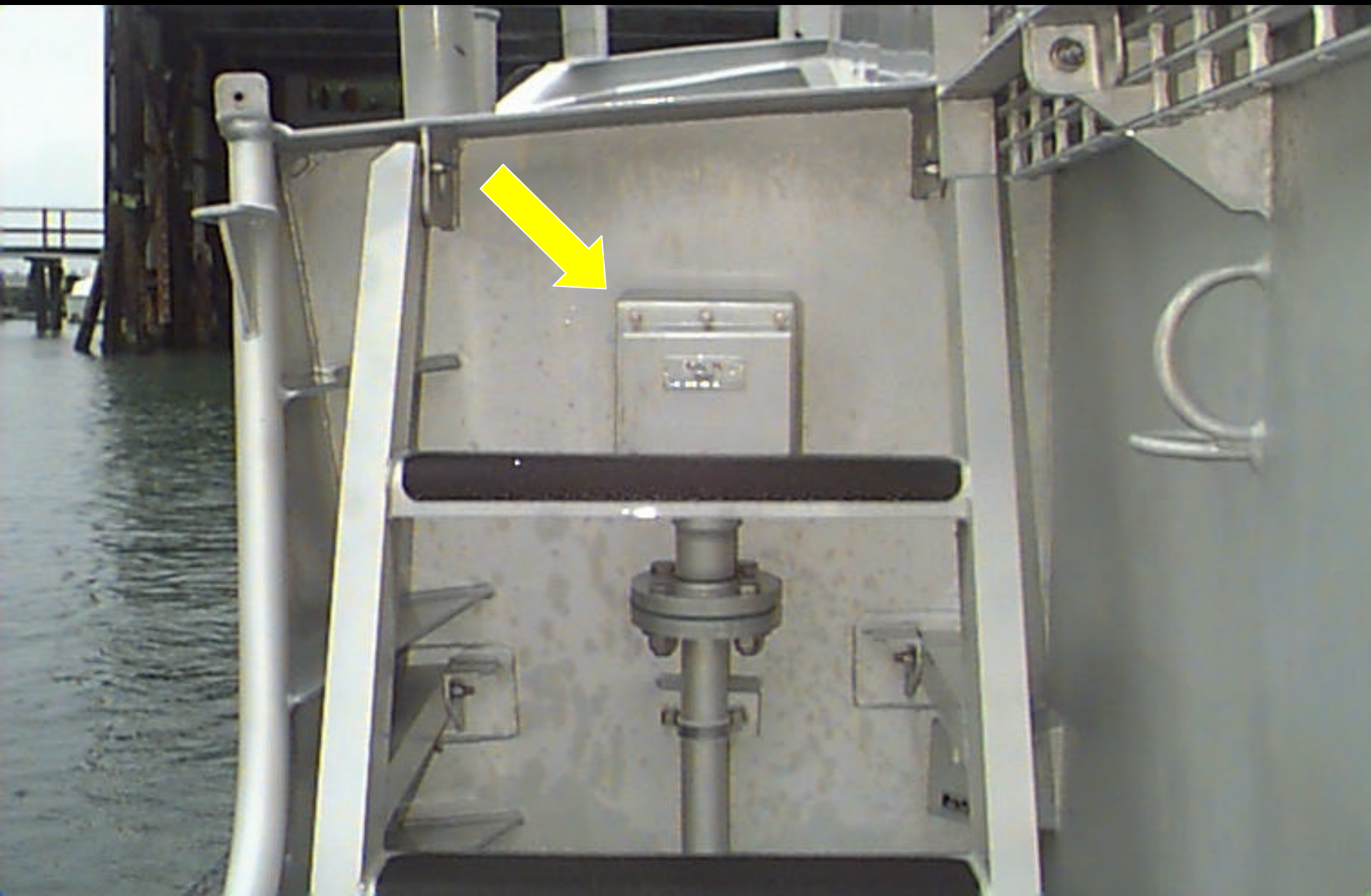
# Major Components

- ◆ Fuel tank
- ◆ Fuel tank vent
- ◆ Emergency cutoff valve
- ◆ Primary filter
- ◆ Priming pump
- ◆ Fuel pump
- ◆ Secondary filter
- ◆ Restricted orifice
- ◆ Fuel cooler
- ◆ ECM fuel cooler plate
- ◆ Back Pressure Relief Check Valve

# Fuel Tank

- ◆ Capacity:
  - 100% 394 gal.
  - 95% 373 gal.
  - 16 gal unusable
- ◆ Centered on keel
- ◆ Located between frames 5 and 8
- ◆ 3 inspection covers
- ◆ Baffles installed at frame 6 and 7
- ◆ Suction piping at frame 6
- ◆ Fuel suction box

# Fuel Tank Vent

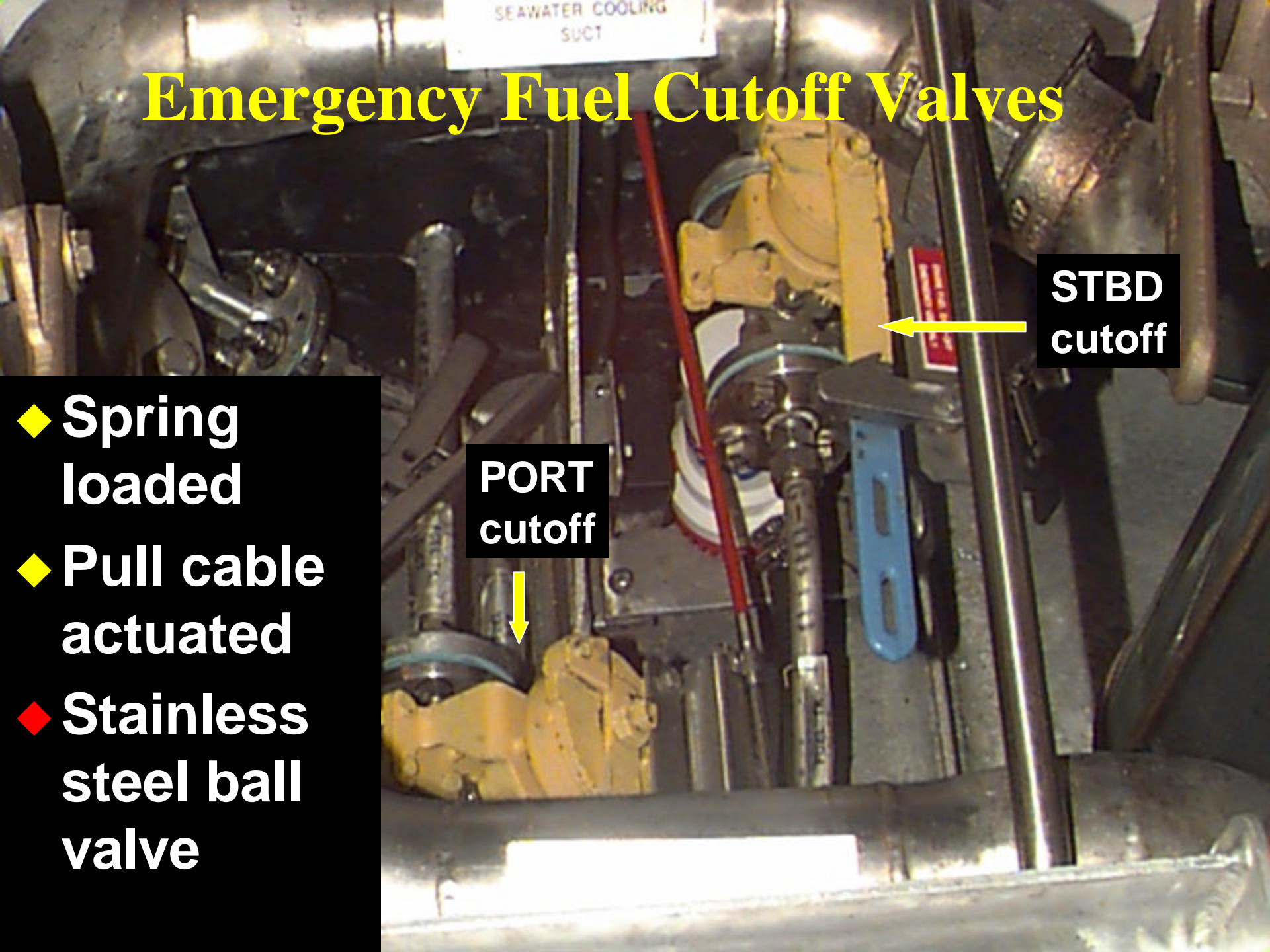


# Emergency Fuel Cutoff Valves

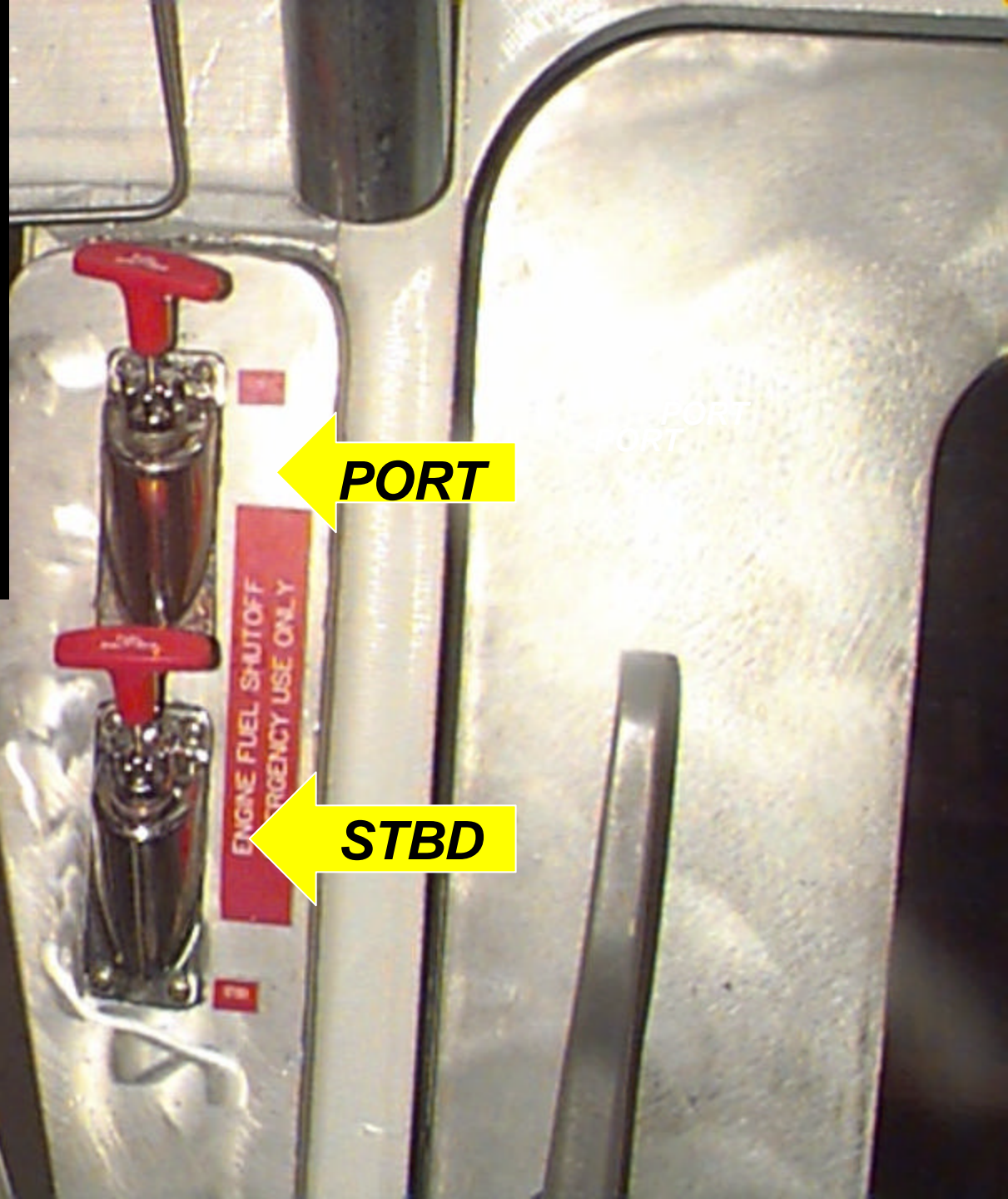
**STBD  
cutoff**

**PORT  
cutoff**

- ◆ Spring loaded
- ◆ Pull cable actuated
- ◆ Stainless steel ball valve



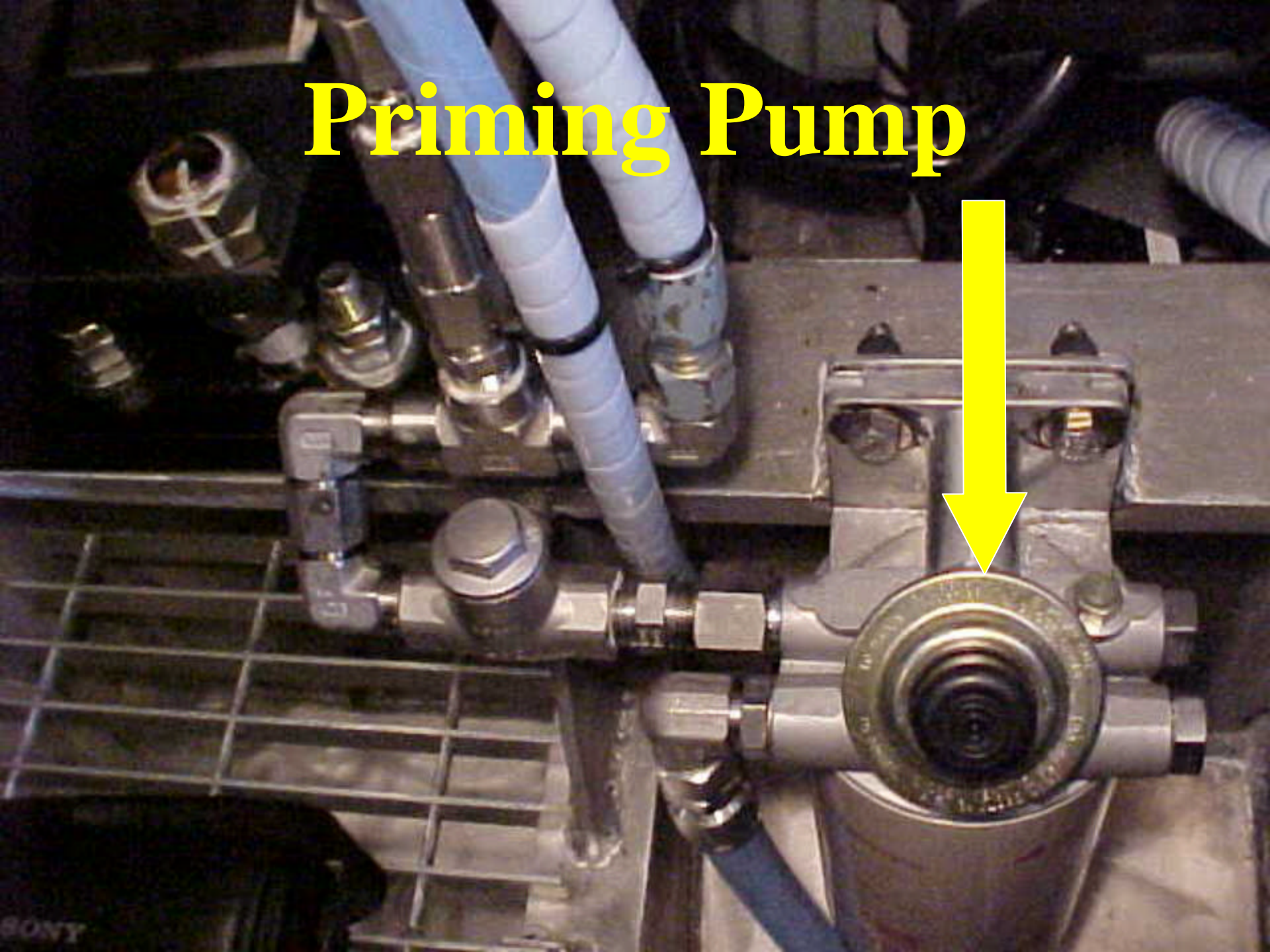
# Emergency Fuel Cutoff Valve Pull Handles



# Primary Fuel Filter



# Priming Pump





**Back Pressure Relief  
Check Valve**

# Fuel Pump

- ◆ Gear type
- ◆ Driven off blower
- ◆ Fuel system pressure:
  - 50 to 70 psi
- ◆ Relief valve pressure:
  - 65 to 70 psi



# Secondary Fuel Filter

◆ Spin on type

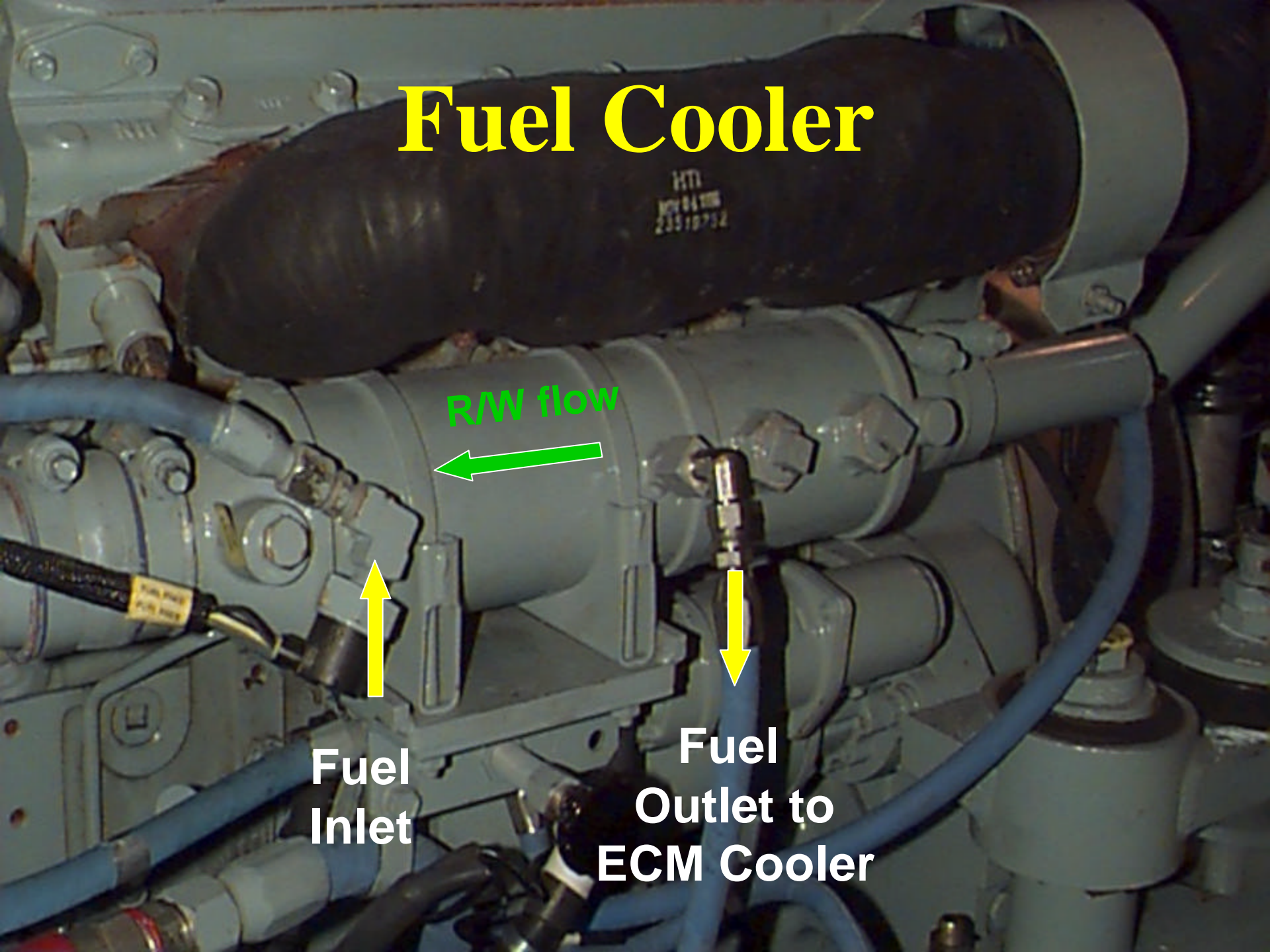


# Fuel Cooler

R/W flow

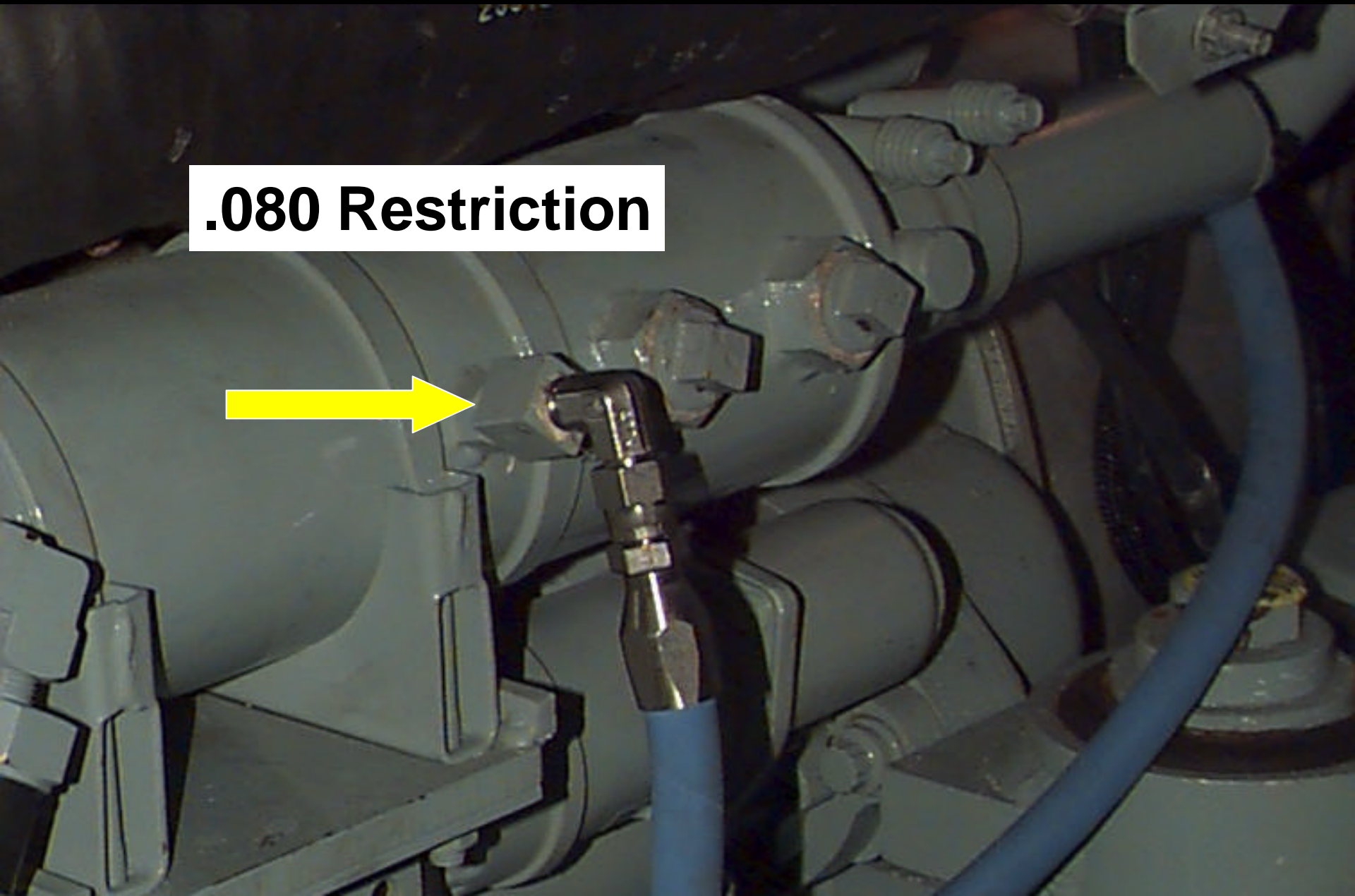
Fuel  
Inlet

Fuel  
Outlet to  
ECM Cooler

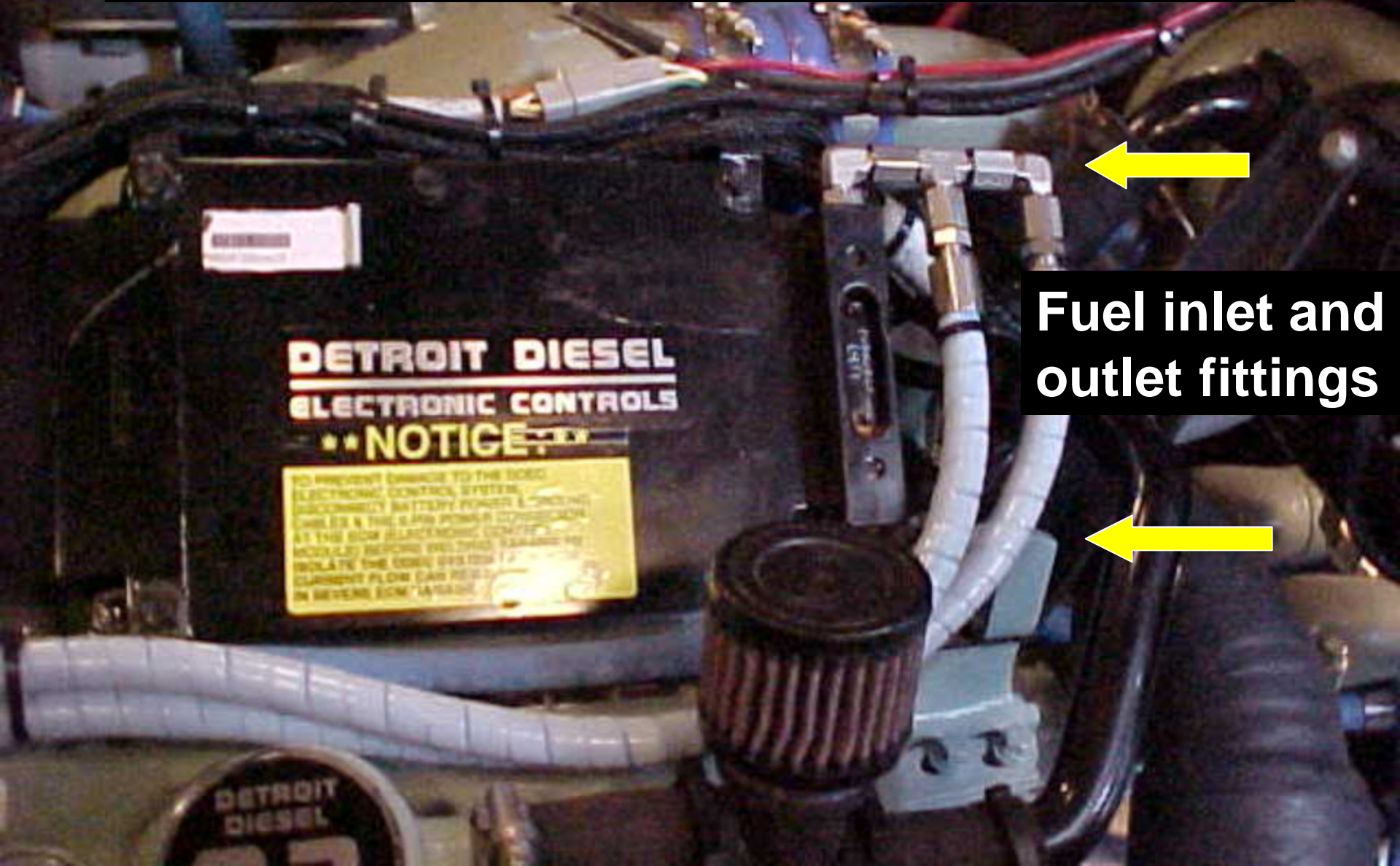


# Restricted Orifice

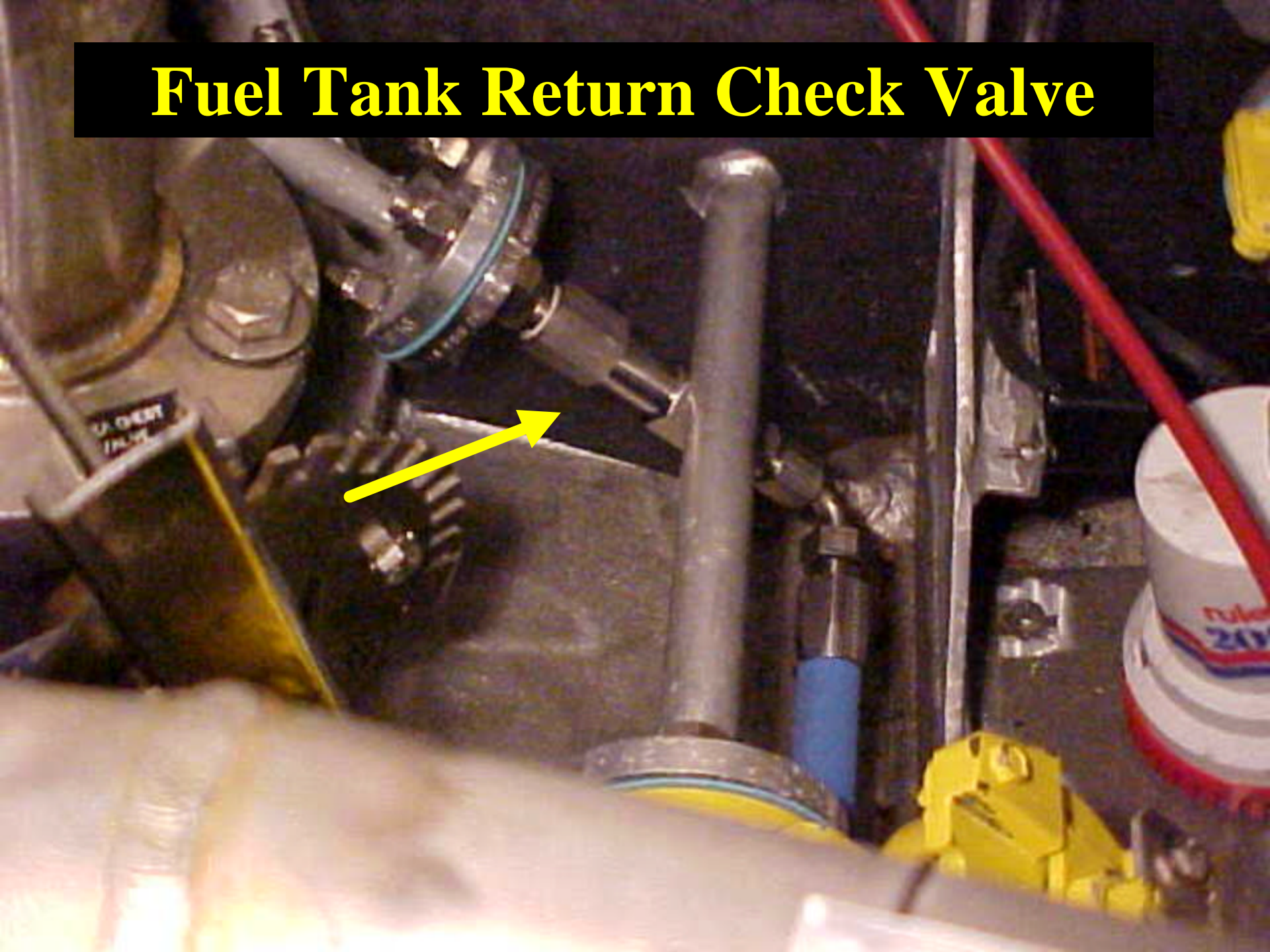
**.080 Restriction**

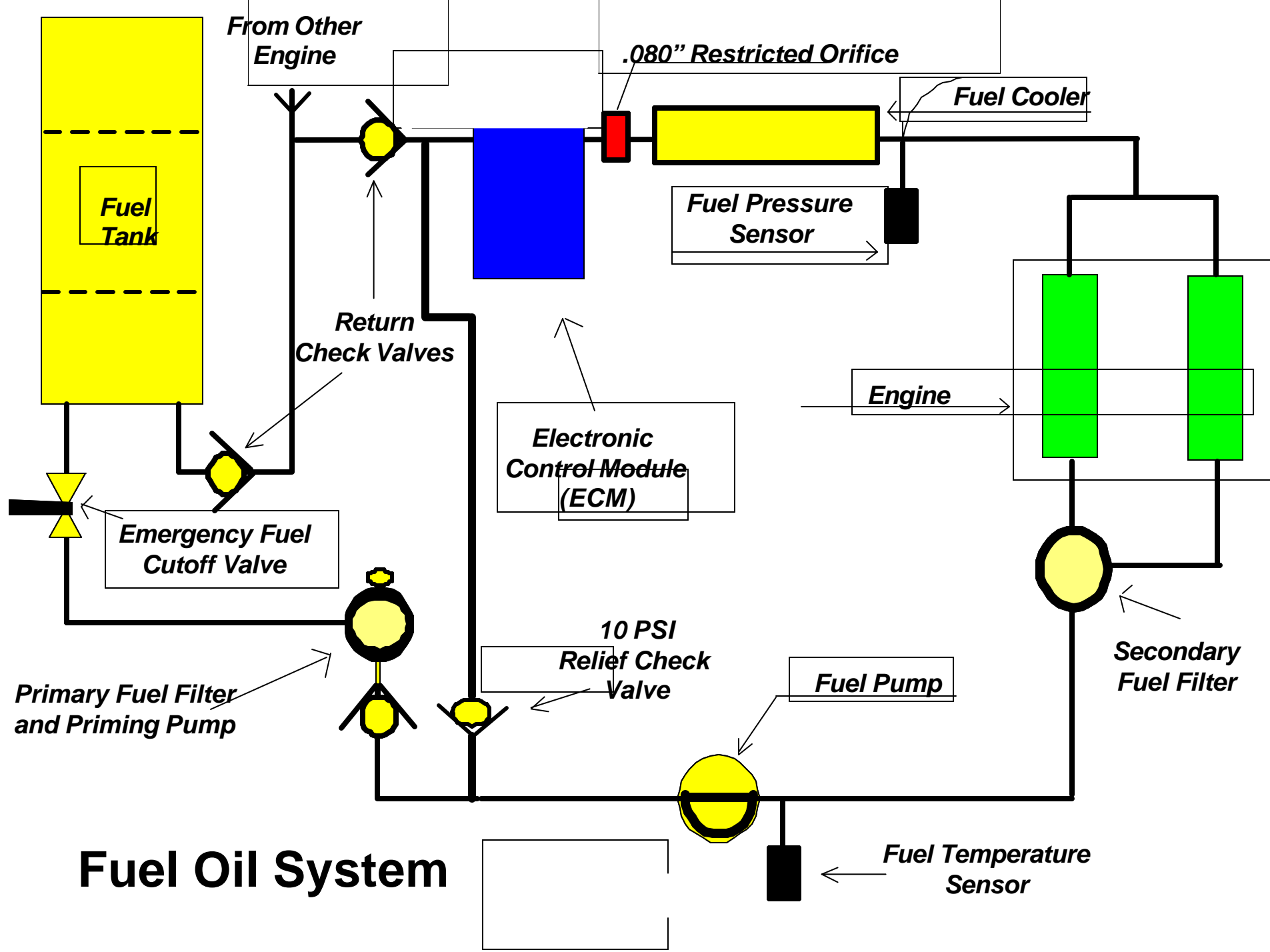


# ECM Cooler Plate



# Fuel Tank Return Check Valve





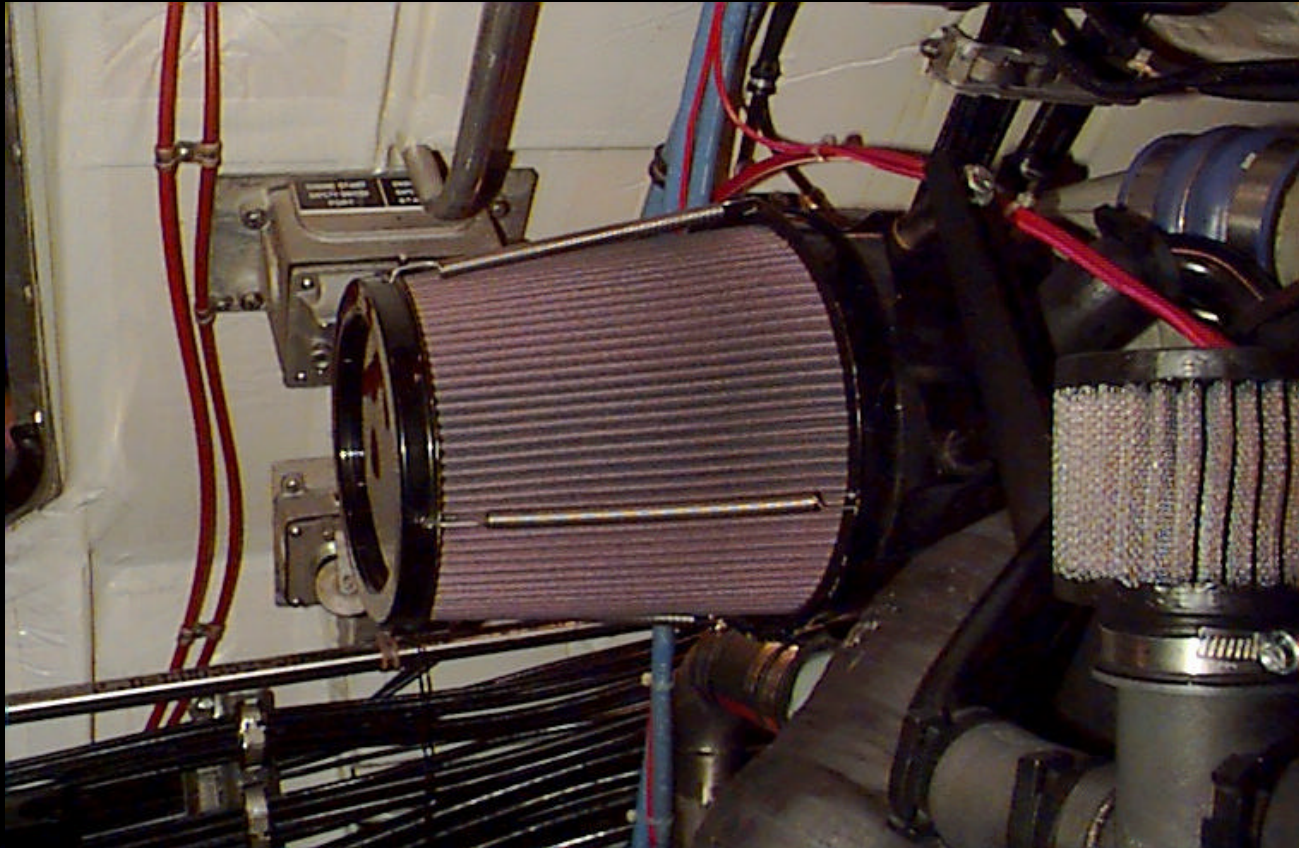
# Air Sep System



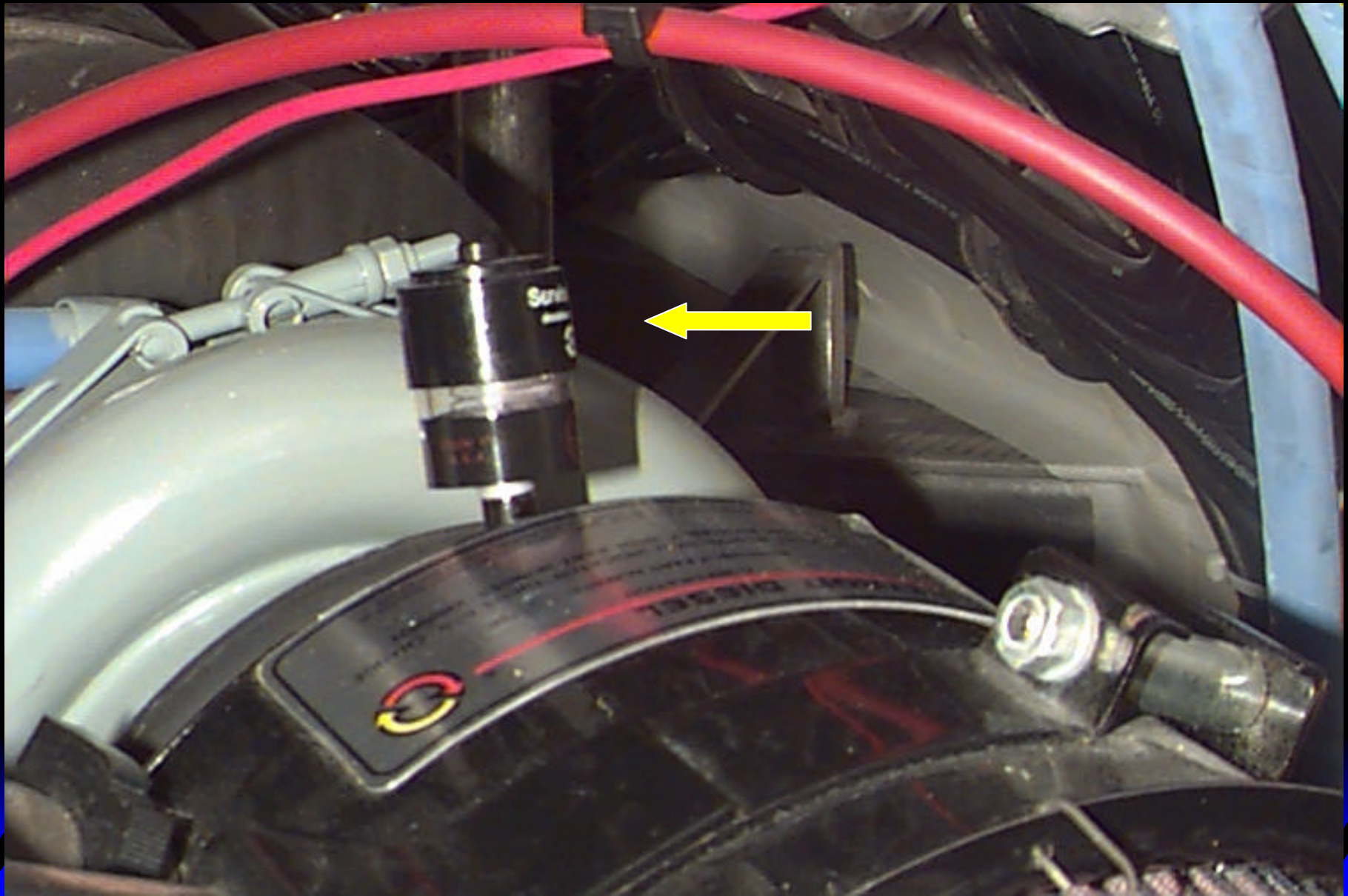
# System Components

- ◆ Cotton Filter Element
- ◆ Air Inlet Restriction Indicator
- ◆ Vacuum Limiter
- ◆ Collector Assy.
- ◆ Check Valve
- ◆ Oil Drain Hose

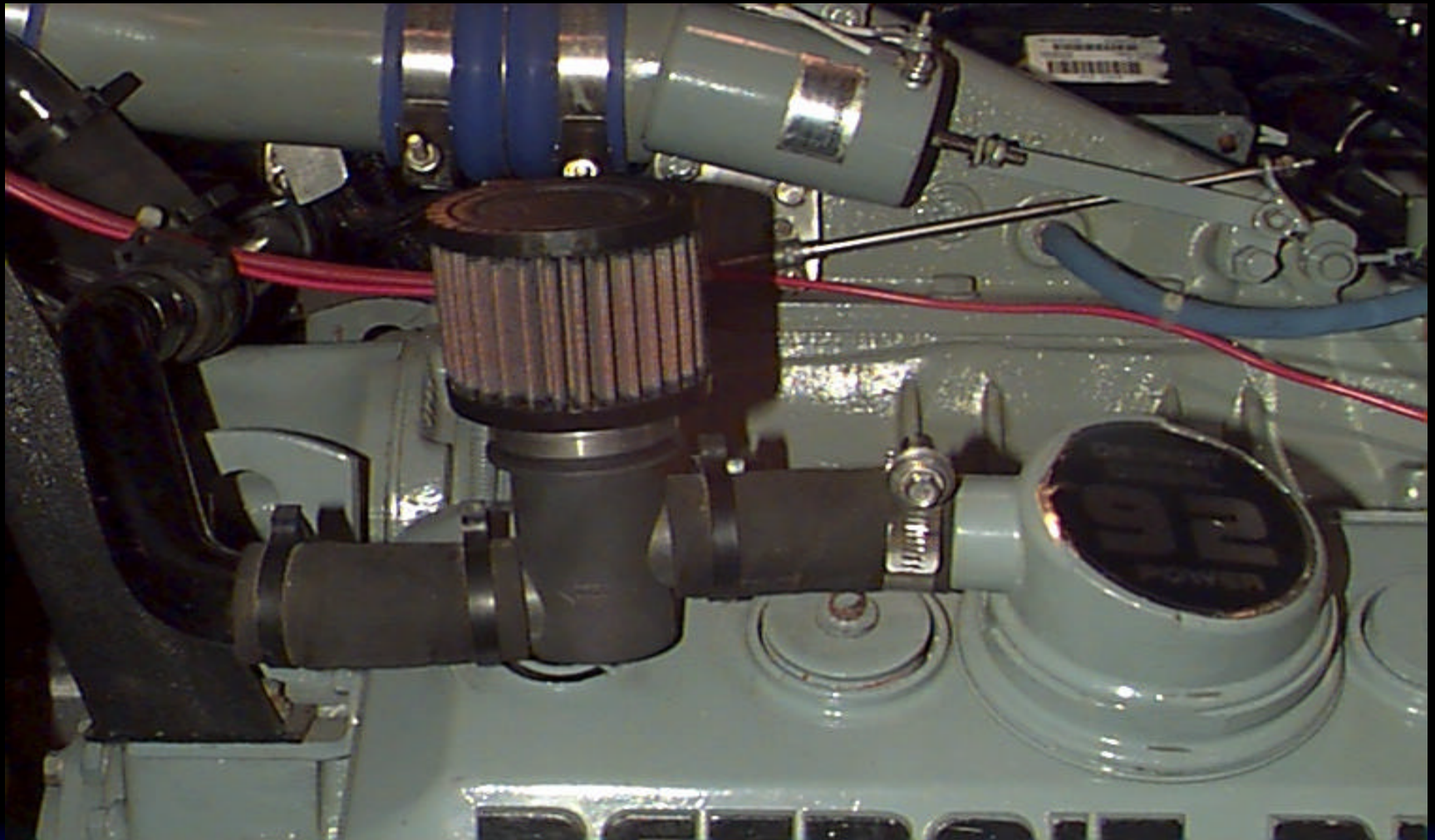
# Cotton Filter Element and Collector Housing



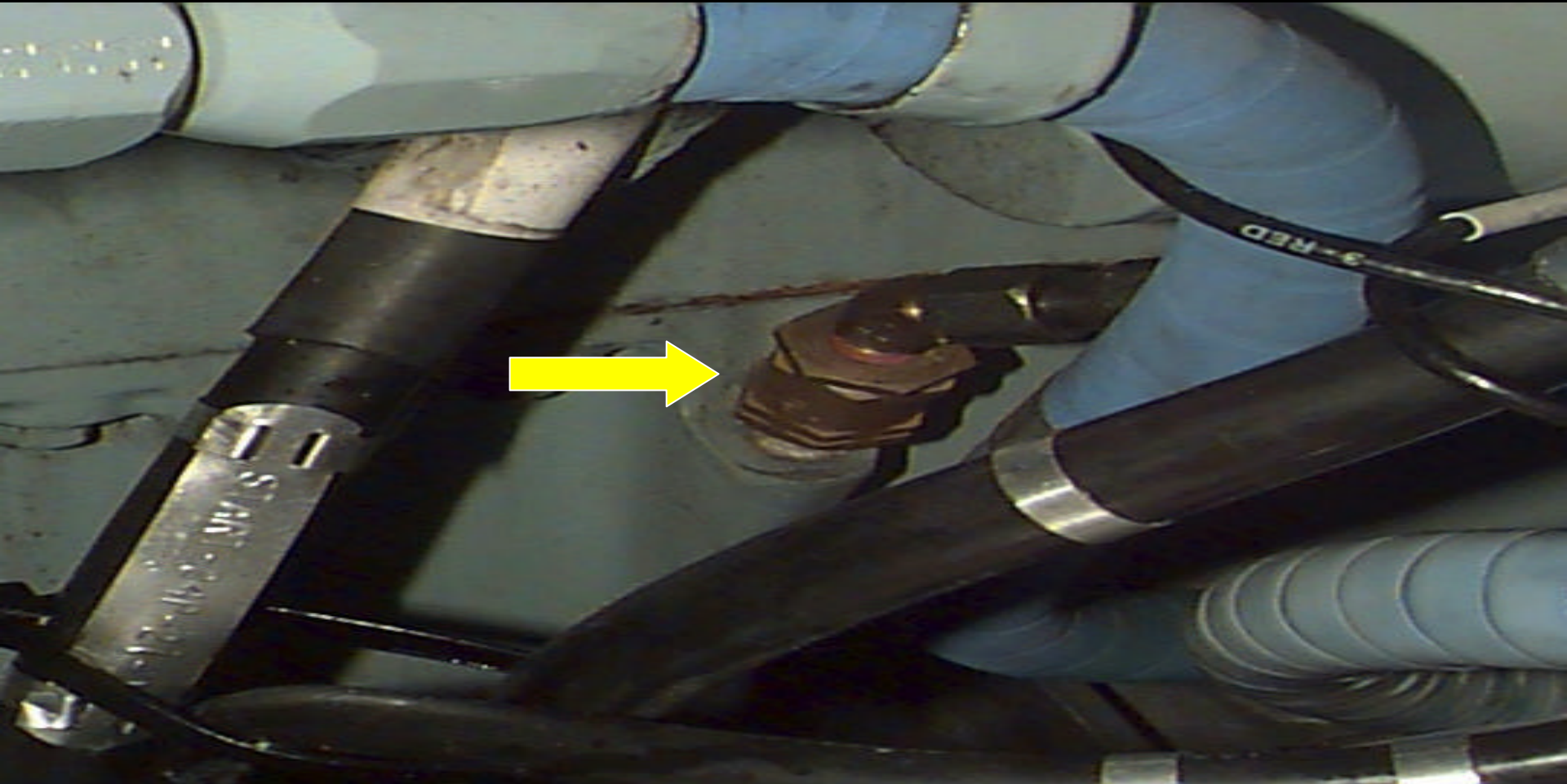
# Air Inlet Restriction Indicator



# Vacuum Limiter

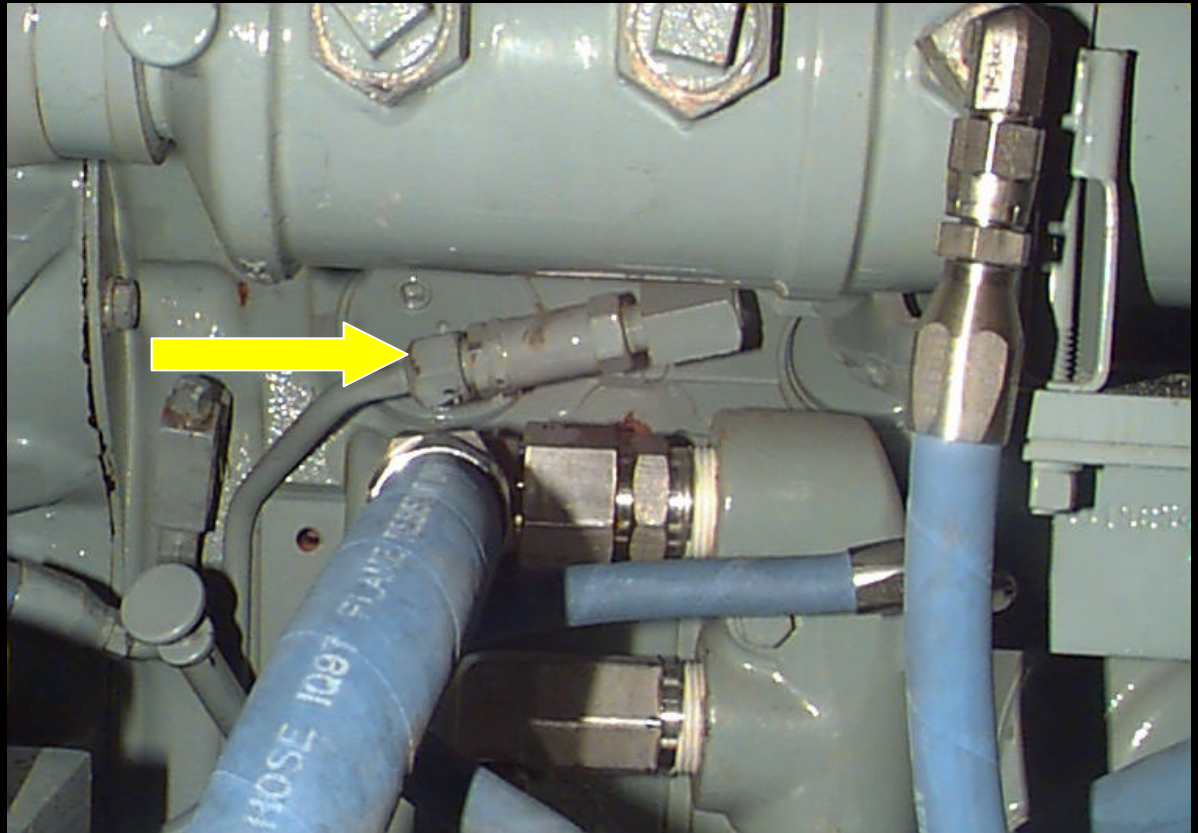


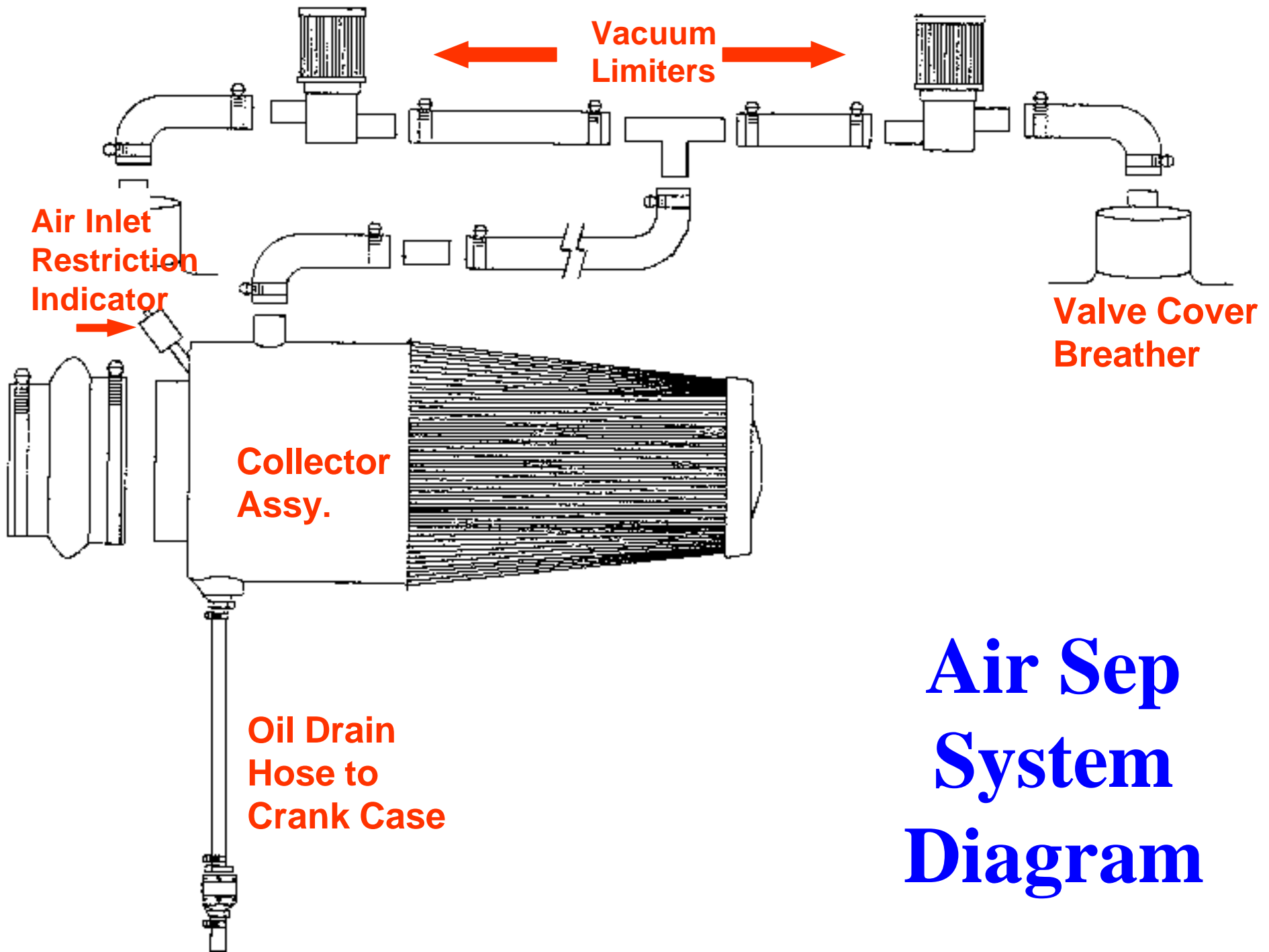
# Oil Drain Check Valve and Hose



# Air Box Check Valve

- ◆ Check Valve Opens at Idle
- ◆ No Airflow above 1400 RPM
- ◆ Air Box Drains to Engine Crankcase

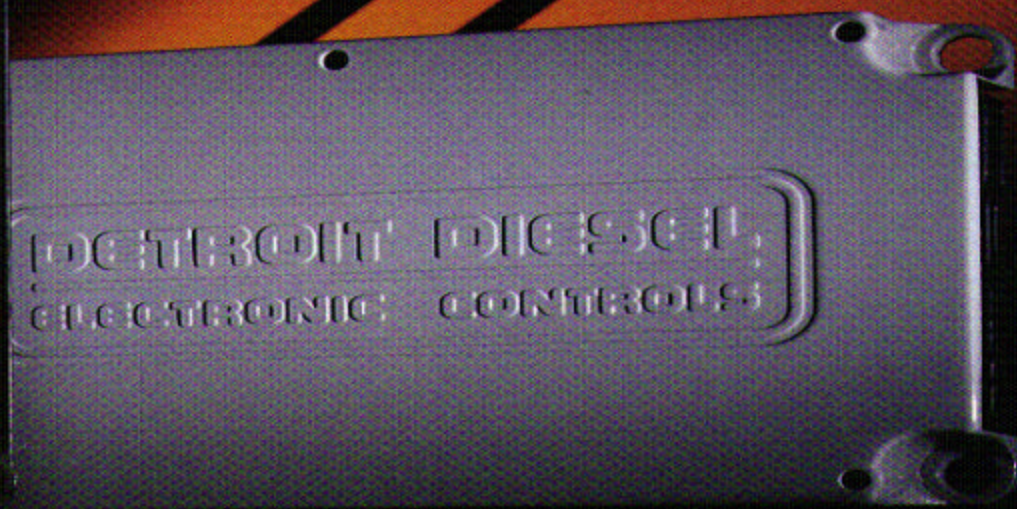




# Air Sep System Diagram

# DETROIT DIESEL

## Electronic Controls



# DDEC Features

- ◆ Computerized Electronic Engine Governing System
- ◆ Electronic Fuel Injection System
- ◆ Self Diagnostics
- ◆ Improved Engine Performance
- ◆ Rapid Warm-Up
- ◆ Precise Engine Synchronization
- ◆ Low Idle Operation
- ◆ Engine Stall, Transmission and Overload Protection

# DDEC Components

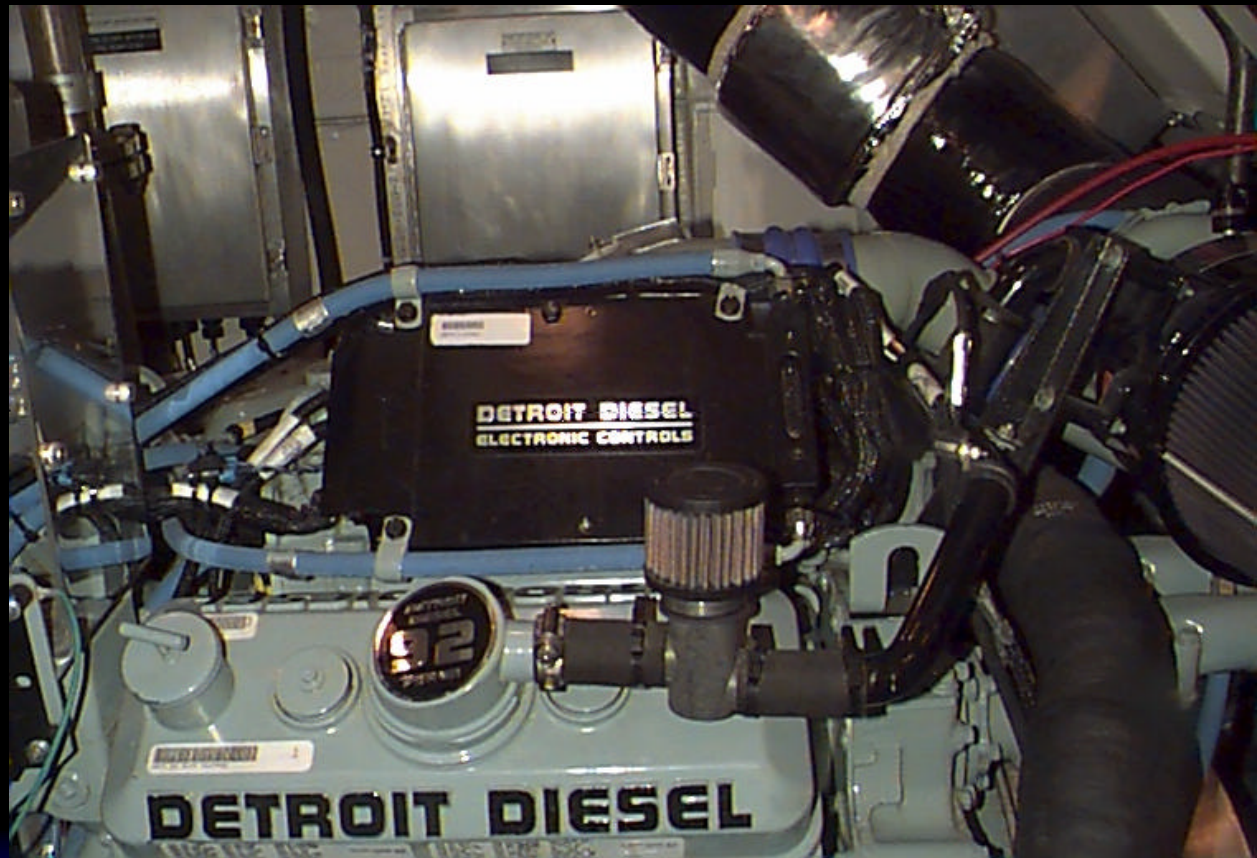
- ◆ **E**lectronic **C**ontrol **M**odule (**ECM**)
- ◆ **E**lectronic **U**nit **I**njector (**EUI**)
- ◆ Sensors:
  - **S**ynchronous **R**eference **S**ensor (**SRS**)
  - **T**iming **R**eference **S**ensor (**TRS**)
  - Turbo Boost Sensor
  - Coolant Temperature Sensor
  - Coolant Level Sensor
  - Oil and Fuel Temperature Sensors
  - Oil and Fuel Pressure Sensors

# DDEC III - How it works.....

- ◆ Sensors and operator inputs send signals to the Electronic Control Module
- ◆ Information sent to the Electronic Control Module is used to precisely regulate engine performance

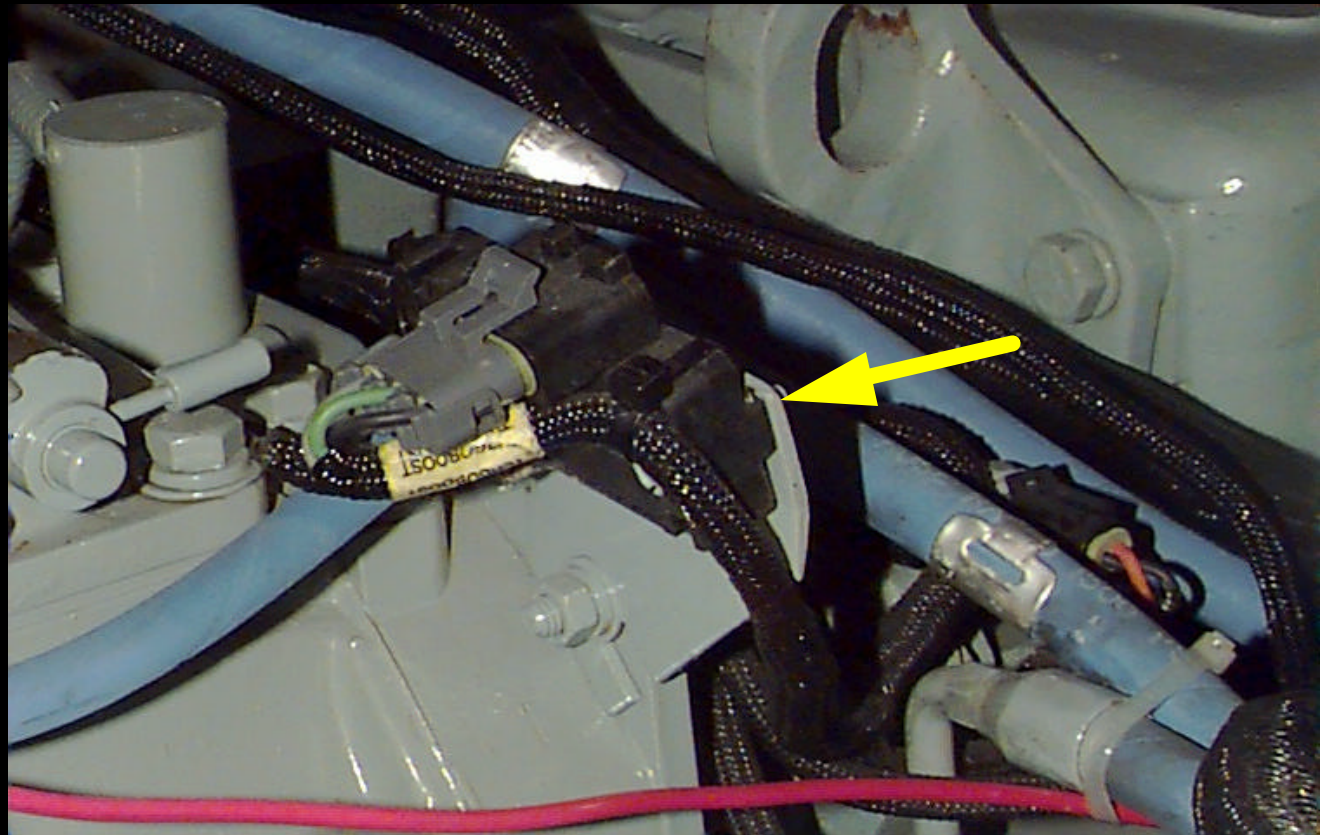
# Electronic Control Module (ECM)

- ◆ The ECM is the computer for each individual engine
- ◆ Performs diagnostic checks of engine systems
- ◆ Controls basic engine functions



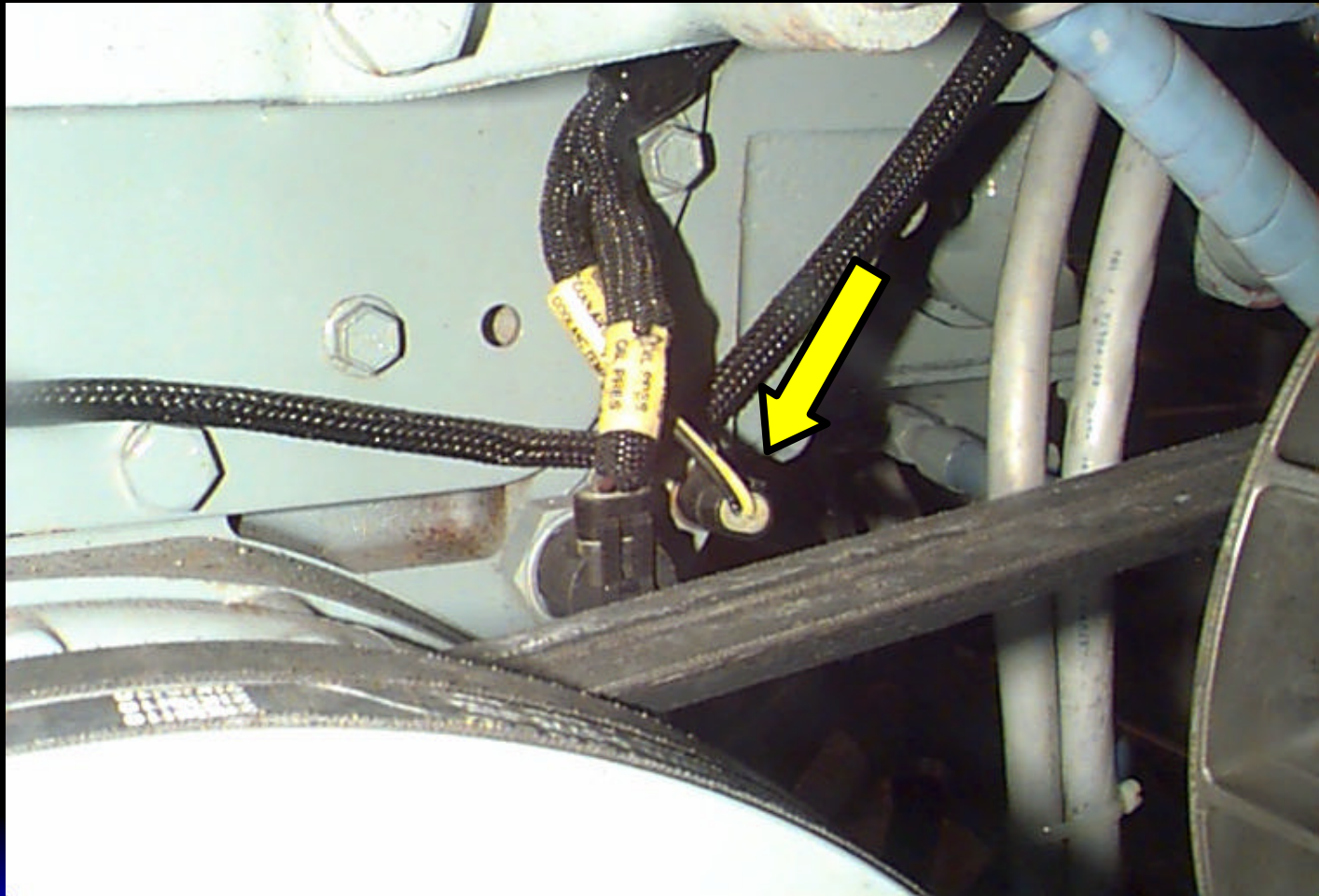
# Turbo Boost Sensor

- ◆ Monitors turbocharger compressor discharge
- ◆ Provides data to ECM for smoke control during engine acceleration



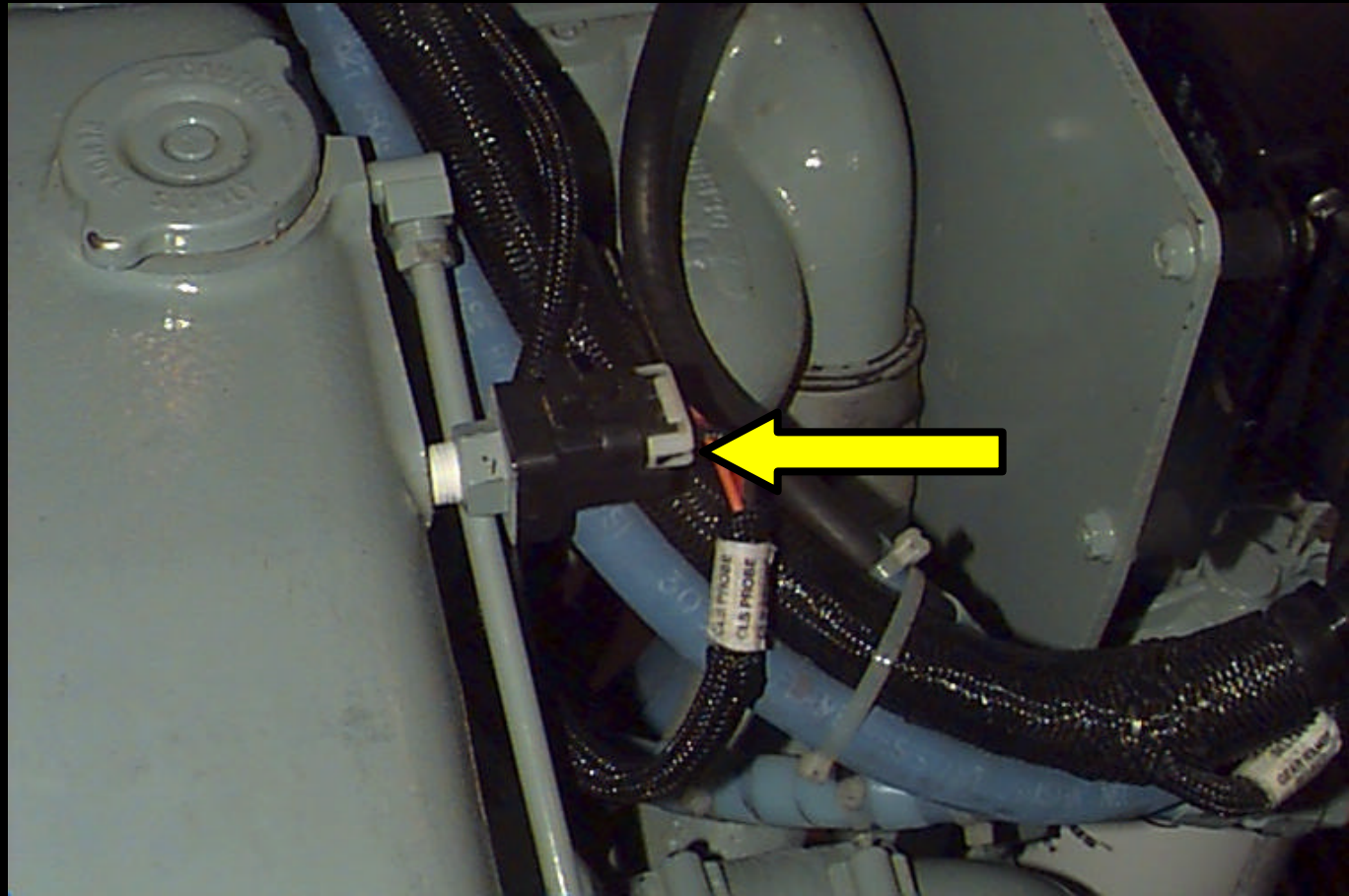
# Coolant Temperature Sensor

- ◆ Monitors coolant temperature
- ◆ Triggers engine alarm for engine protection



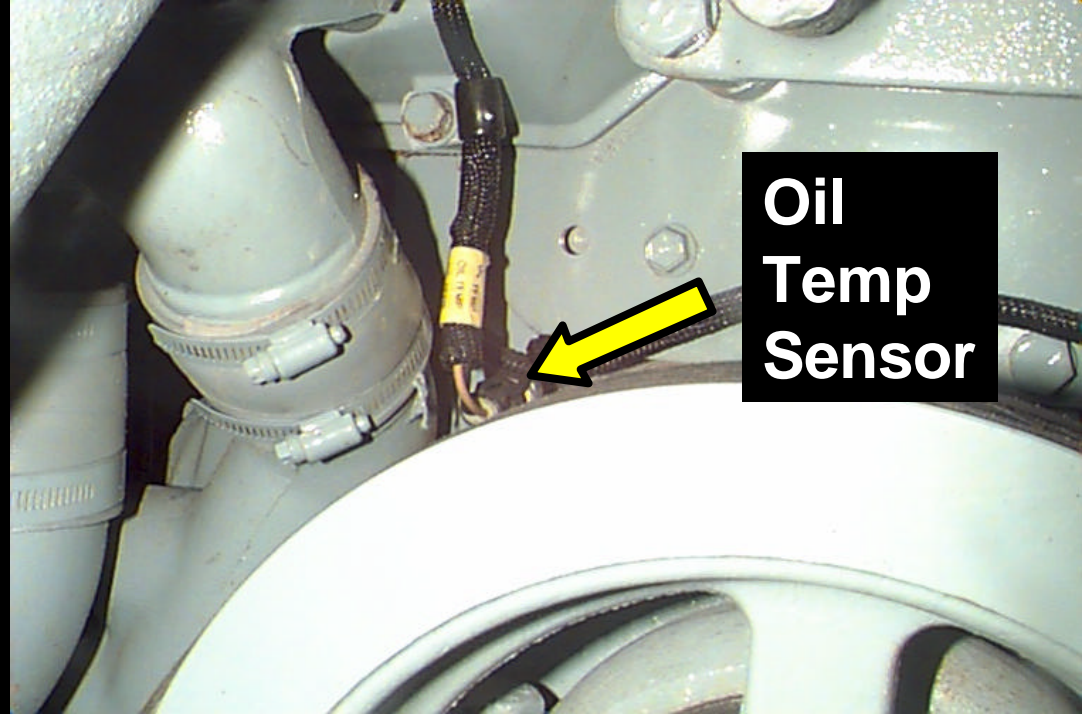
# Coolant Level Sensor

- ◆ Triggers engine alarm if coolant level drops

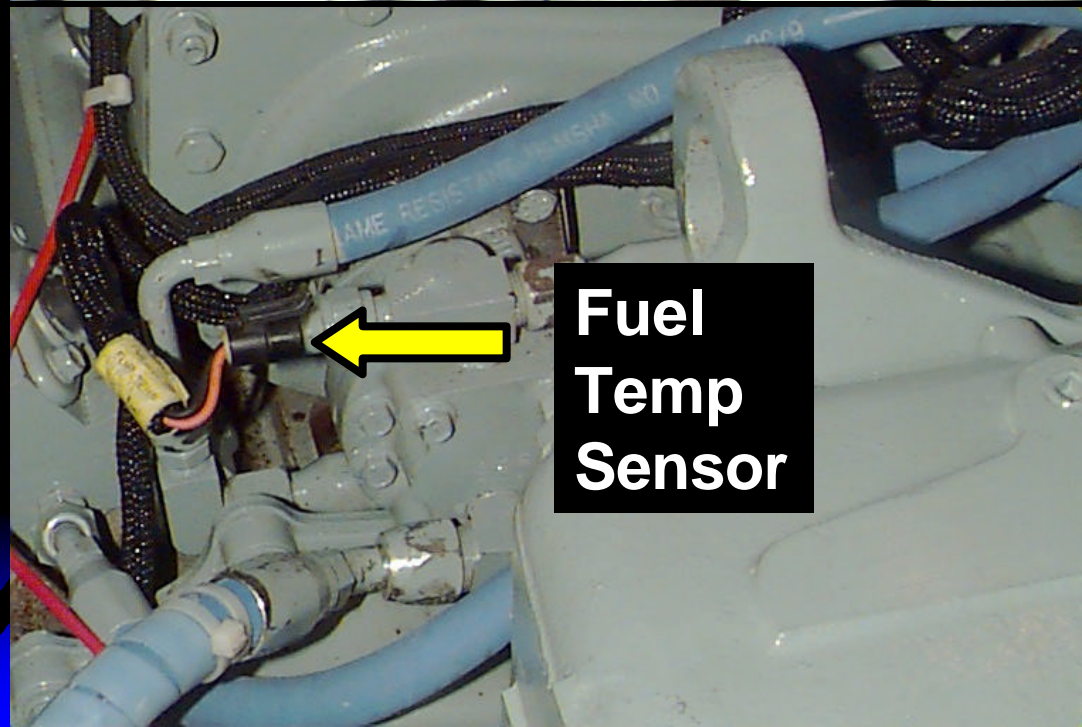


# Oil and Fuel Temperature Sensors

- ◆ Oil temp sensor
- ◆ Triggers engine alarm
- ◆ Provides ECM with data to improve cold starts and reduce white smoke
- ◆ Fuel temp sensor
- ◆ Provides ECM with data to maintain horsepower based on fuel temperature



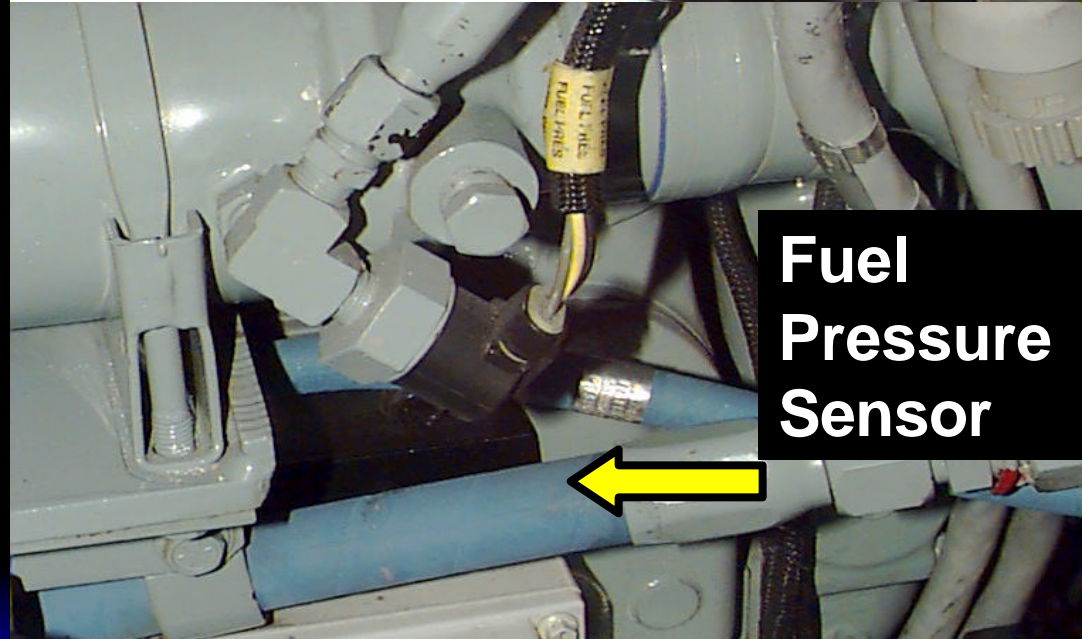
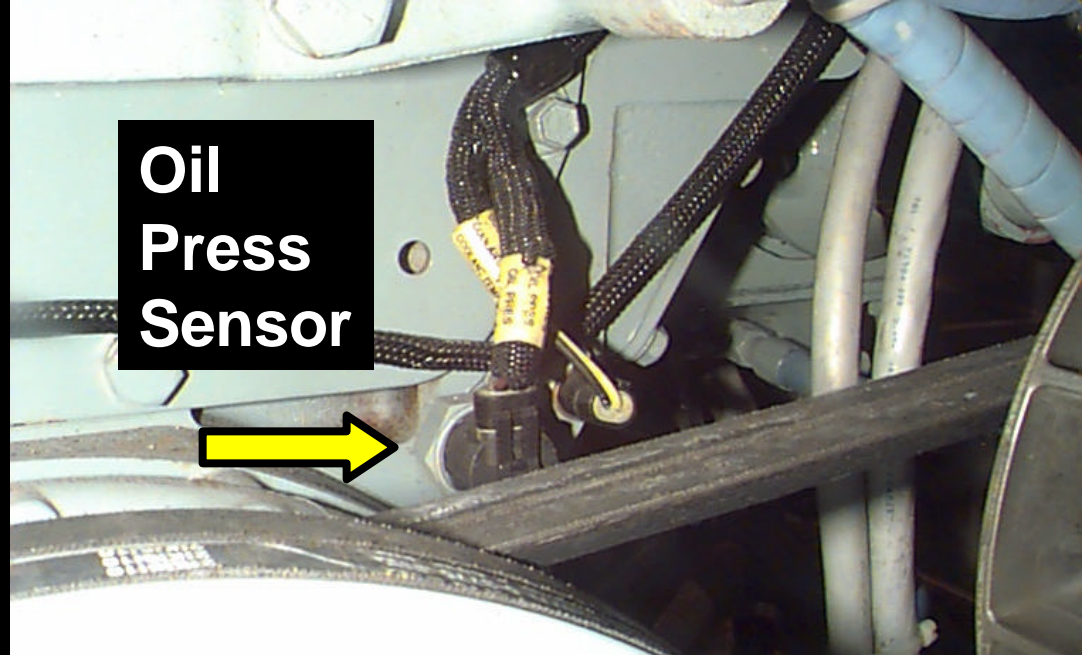
**Oil  
Temp  
Sensor**



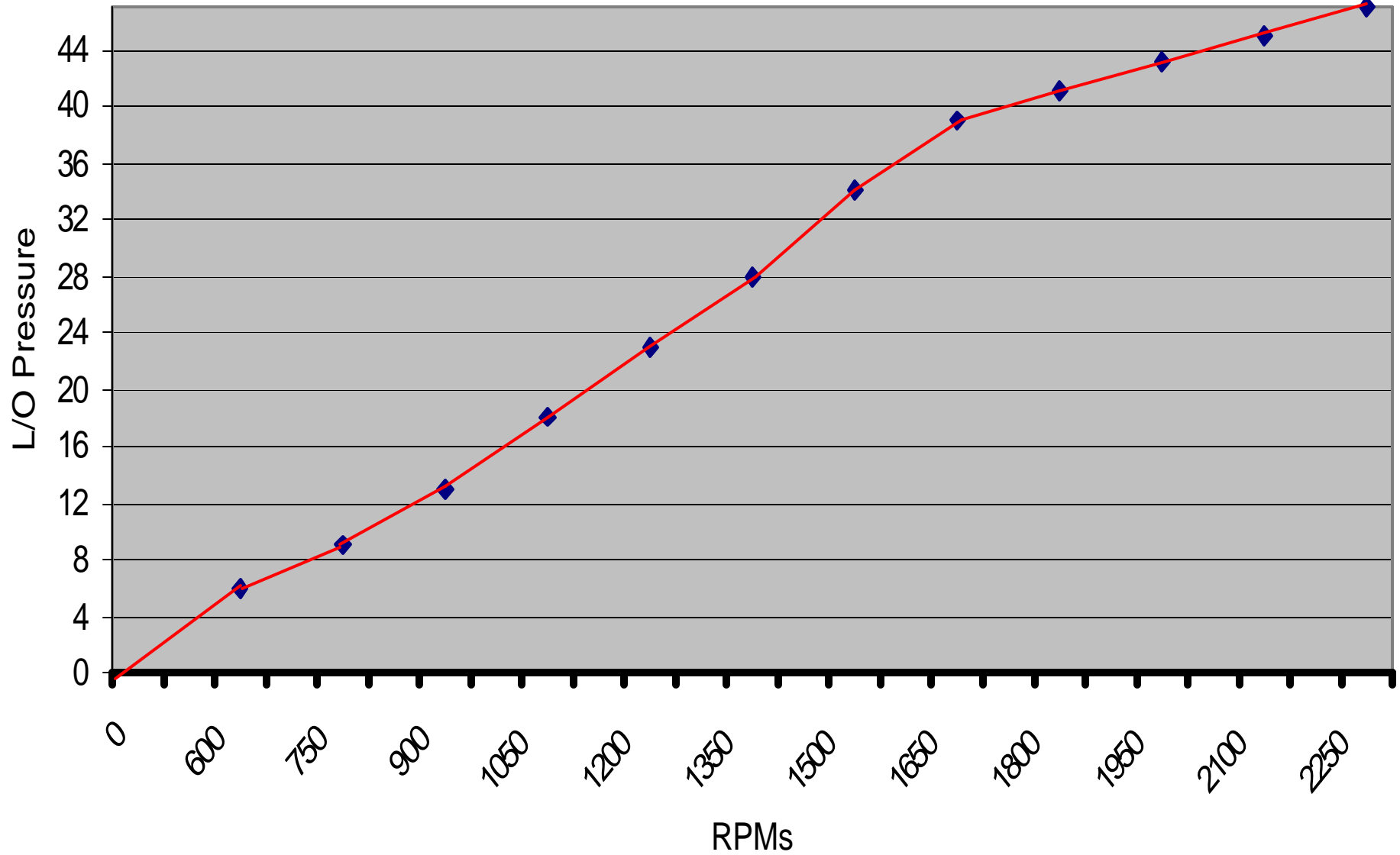
**Fuel  
Temp  
Sensor**

# Oil and Fuel Pressure Sensors

- ◆ Both alarms are variable
- ◆ Trigger engine alarm if pressure drops at a given RPM



## L/O Pressure Alarm Setpoints



# **DDEC**

## **Vessel Components**

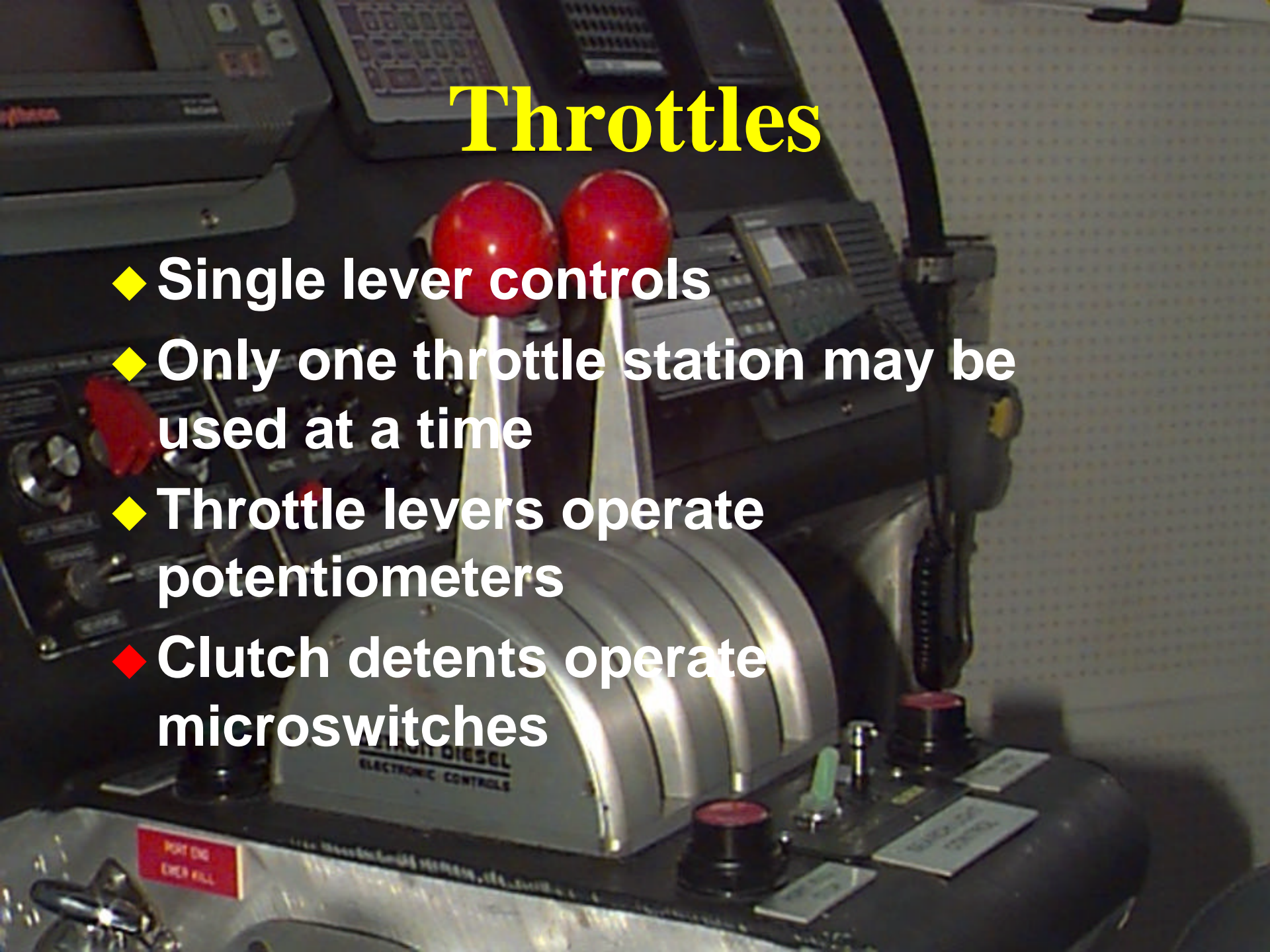


# System Components

- ◆ Throttles
- ◆ Station Control Panel
- ◆ **E**lectronic **D**isplay **M**odule (EDM)
- ◆ **C**ontrol **S**tation **I**nterface **M**odule (CSIM)
- ◆ **E**ngine **R**oom **I**nterface **M**odule (ERIM)
- ◆ **E**lectronic **G**ear **I**nterface **M**odule (EGIM)
- ◆ **M**anufactures **I**nterface **M**odule (MIM)
- ◆ Emergency back-up panel

# Throttles

- ◆ Single lever controls
- ◆ Only one throttle station may be used at a time
- ◆ Throttle levers operate potentiometers
- ◆ Clutch detents operate microswitches



# Station Control Panel



- ◆ 4 button control panel located at each throttle unit
- ◆ Allows throttle system set-up
- ◆ Allows you to set various operation modes

# Control Panel Operation

## Station Active Button



◆ Allows you to take control of throttle station

# Control Panel Operation

## Low Idle Button



- ◆ Reduces RPM to 600
- ◆ Still allows full throttle range

# Control Panel Operation

## Sync Button



- ◆ Synchronizes the speed of both engines under one throttle
- ◆ Does not synchronize clutch detents

# ENGINE OVERLOAD PROTECTION

- ◆ EDM sounds and flashes “OVERLOAD WARNING” when engine output exceeds the maximum allowed torque limit for more than one minute.
- ◆ After two additional minutes, EDM alarm sounds and flashes “TORQUE OVERLOAD”. Engine will ramp down to the maximum allowed torque limit.

# Control Panel Operation

## Eng Ovr Button



◆ Pressing and releasing the ENG OVR button restores full power range for two minutes.

# Control Panel Operation

## Neutral Throttle Operation



◆ Press and hold Lo Idle and Sync buttons for 1 sec.

# Control Panel Operation

## Transfer Throttle Stations

- ◆ Match throttle levers to clutch detent of active station
- ◆ Press the station active button
- ◆ The red LED light will begin to flash
- ◆ Match throttle levers to the previous station's engine speed setting
- ◆ You have 5 seconds to complete procedure

PORT ENGINE  
EDM

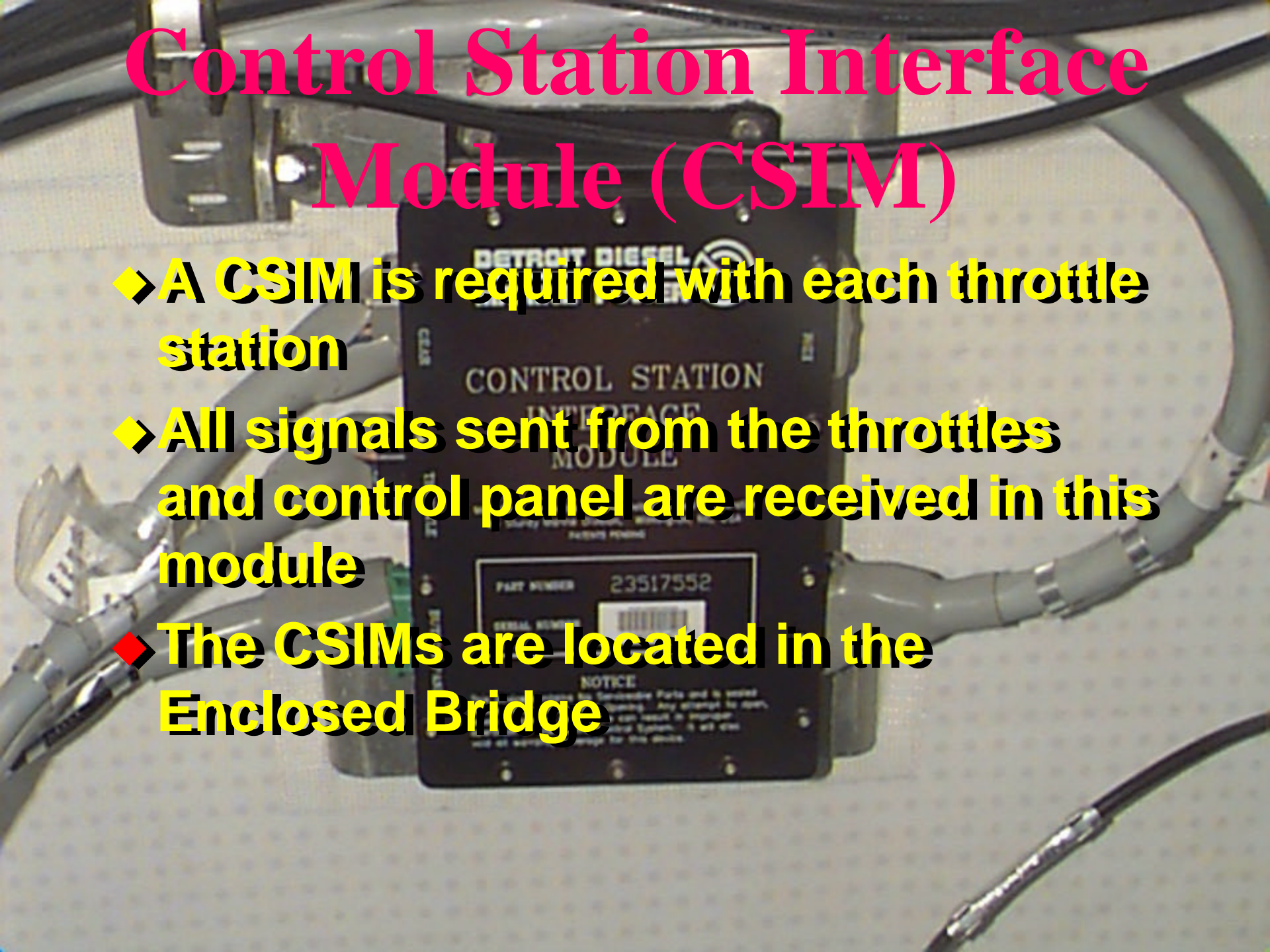
# Electronic Display Module (EDM)

- ◆ Displays engine and R/G information
- ◆ The keypad allows you to access information and features
- ◆ Audible alarm and displays flash codes
- ◆ Edms are located on Open and Enclosed Bridges



# Control Station Interface Module (CSIM)

- ◆ A CSIM is required with each throttle station
- ◆ All signals sent from the throttles and control panel are received in this module
- ◆ The CSIMs are located in the Enclosed Bridge



# Engine Room Interface Module (ERIM)

- ◆ Central processor of the control system
- ◆ Translates signal from CSIMs and sends it to the ECMs and EGIMs
- ◆ Located in the Auxiliary Machinery Space

DETROIT DIESEL  
MARINE POWER

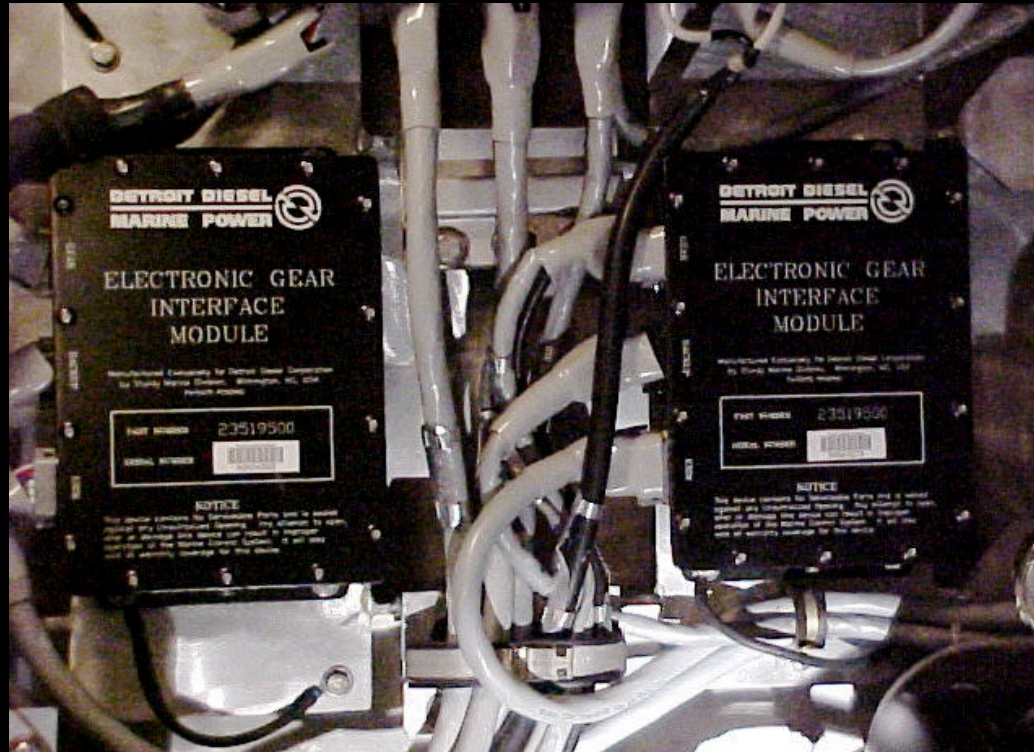


ENGINE ROOM  
INTERFACE  
MODULE

WARNING  
CONNECTION MAY  
VOID WARRANTY

MASTER CONTROL STATION BACKUP PANEL PORT NEW STANDARD NEW BACKUP BATTERY(+) BATTERY(-)

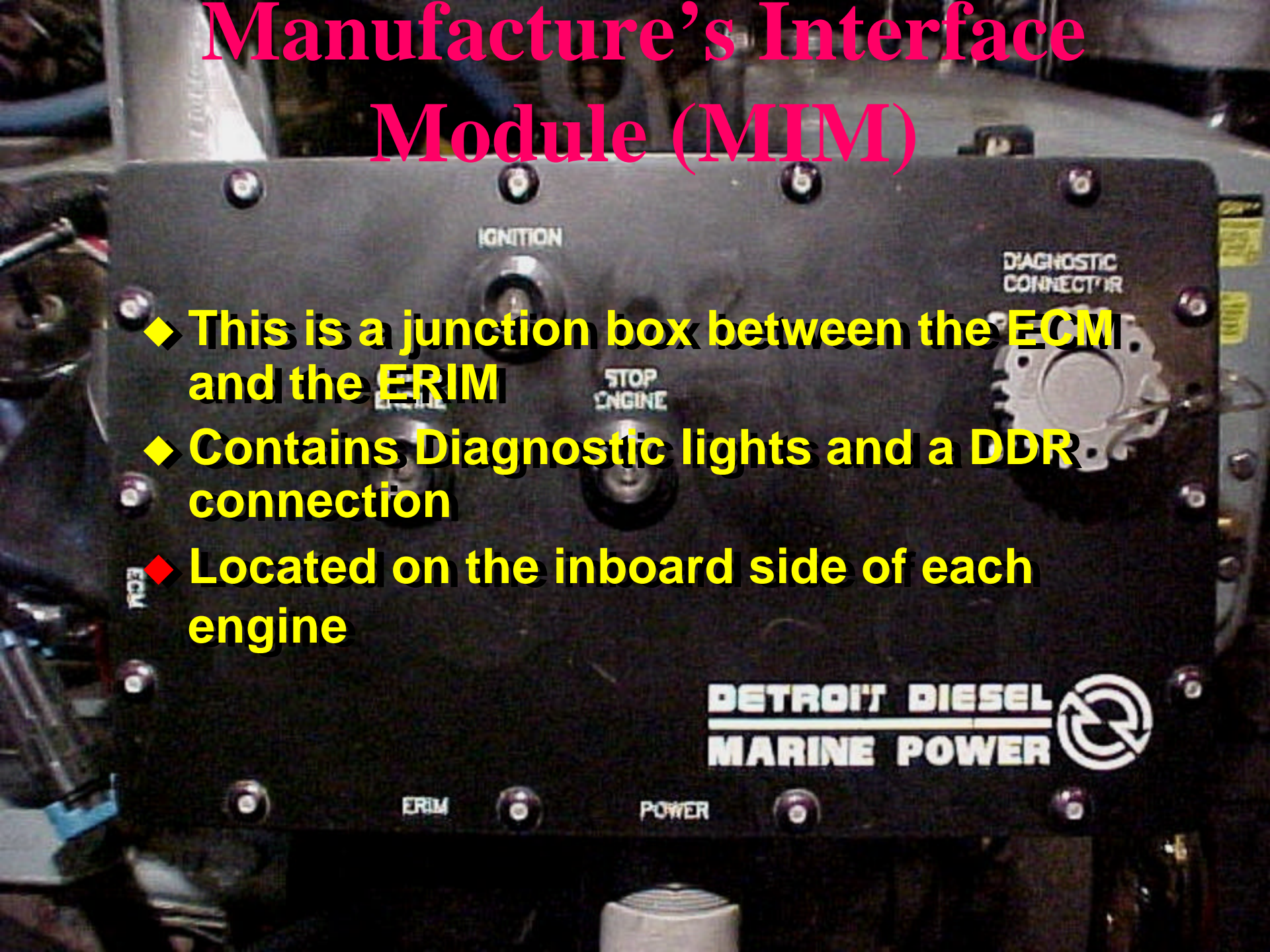
# Electronic Gear Interface Module (EGIM)



- ◆ Receives the shift command from the ERIM and sends it to the R/G
- ◆ Located in the Auxiliary Machinery Space

# Manufacturer's Interface Module (MIM)

- ◆ This is a junction box between the ECM and the ERIM
- ◆ Contains Diagnostic lights and a DDR connection
- ◆ Located on the inboard side of each engine

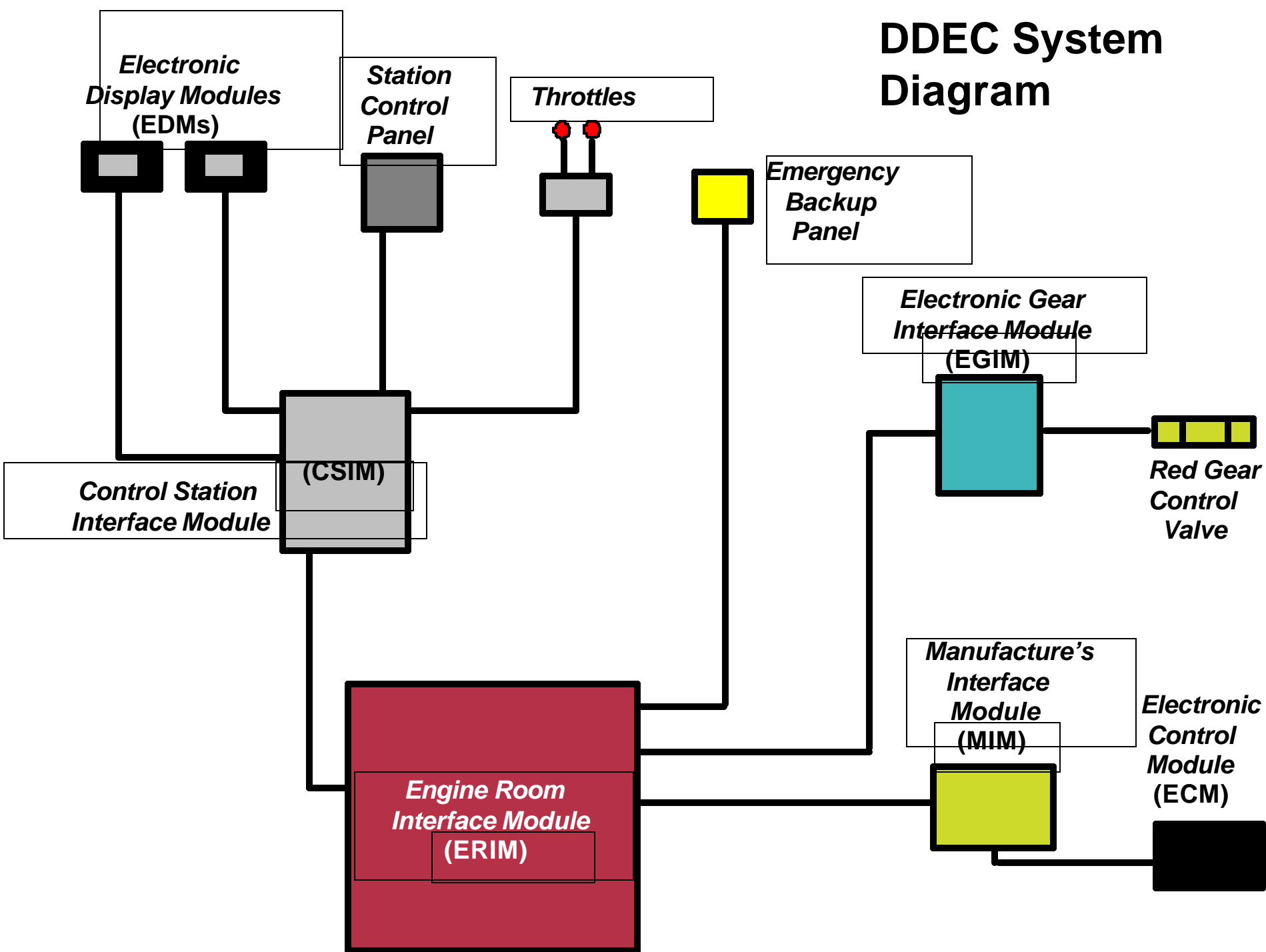


# Emergency Back-Up Panel



- ◆ Directly connected to the ERIM
- ◆ Is used in the event of throttle failure
- ◆ Located in the Enclosed Bridge

# DDEC System Diagram

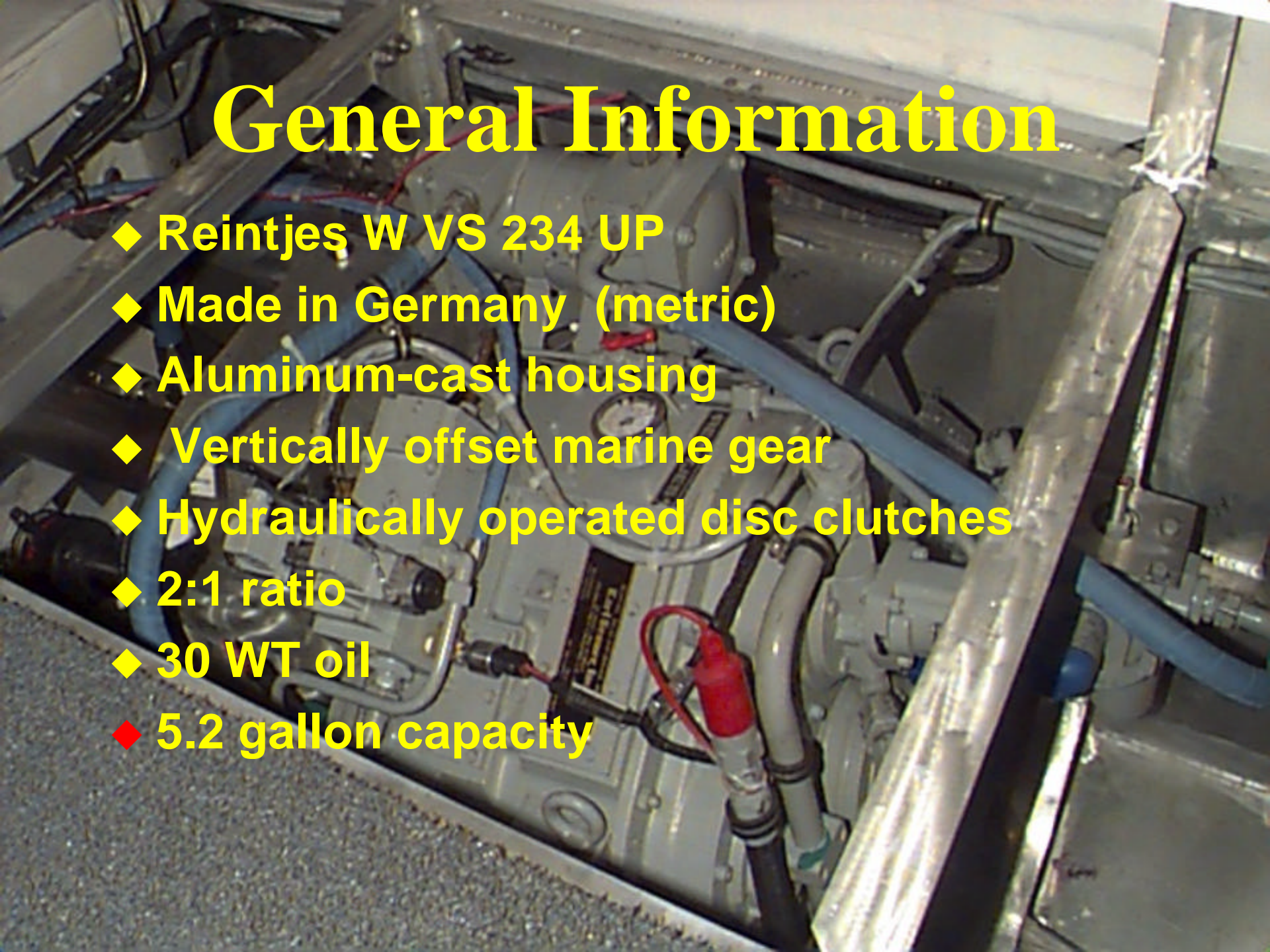


# Reintjes Reduction Gear



# General Information

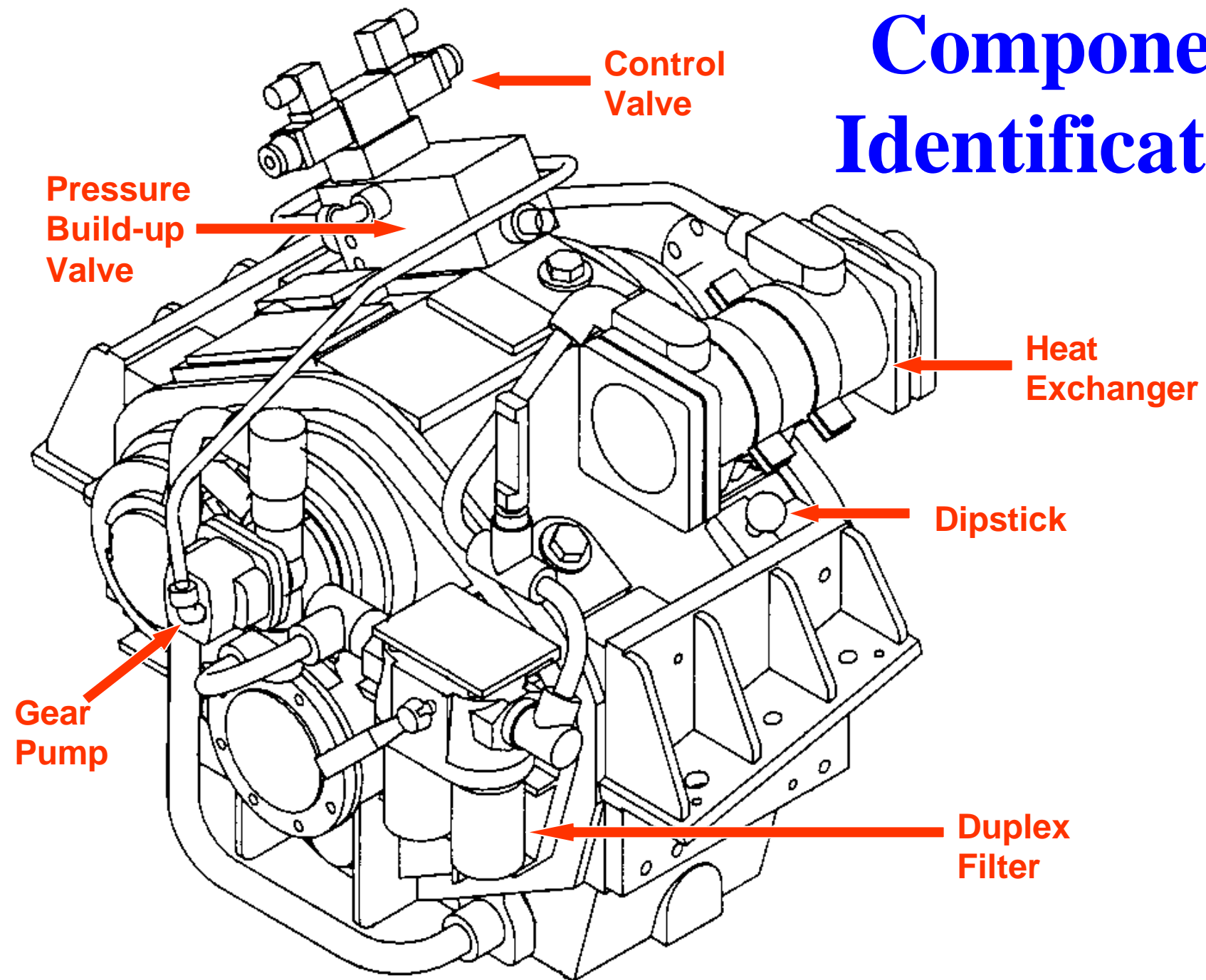
- ◆ Reintjes W VS 234 UP
- ◆ Made in Germany (metric)
- ◆ Aluminum-cast housing
- ◆ Vertically offset marine gear
- ◆ Hydraulically operated disc clutches
- ◆ 2:1 ratio
- ◆ 30 WT oil
- ◆ 5.2 gallon capacity



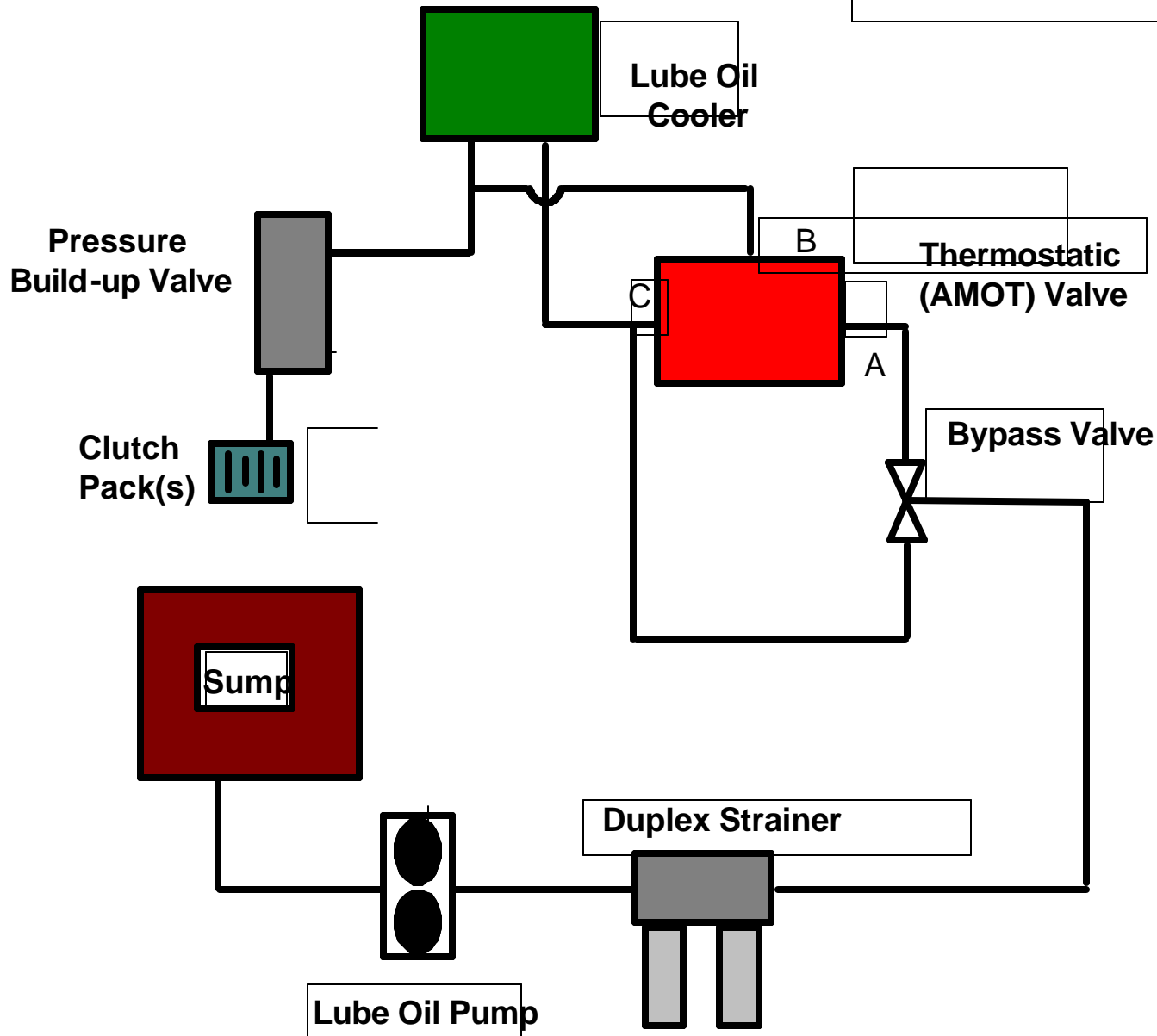
# R/G System Components

- ◆ Gear type pump
- ◆ Oil filter
- ◆ Thermostatic Valve
- ◆ Heat exchanger
- ◆ Pressure build up valve
- ◆ Control valve
- ◆ Come-home feature

# Component Identification



# Red Gear L/O Drawing



# Oil Pressure

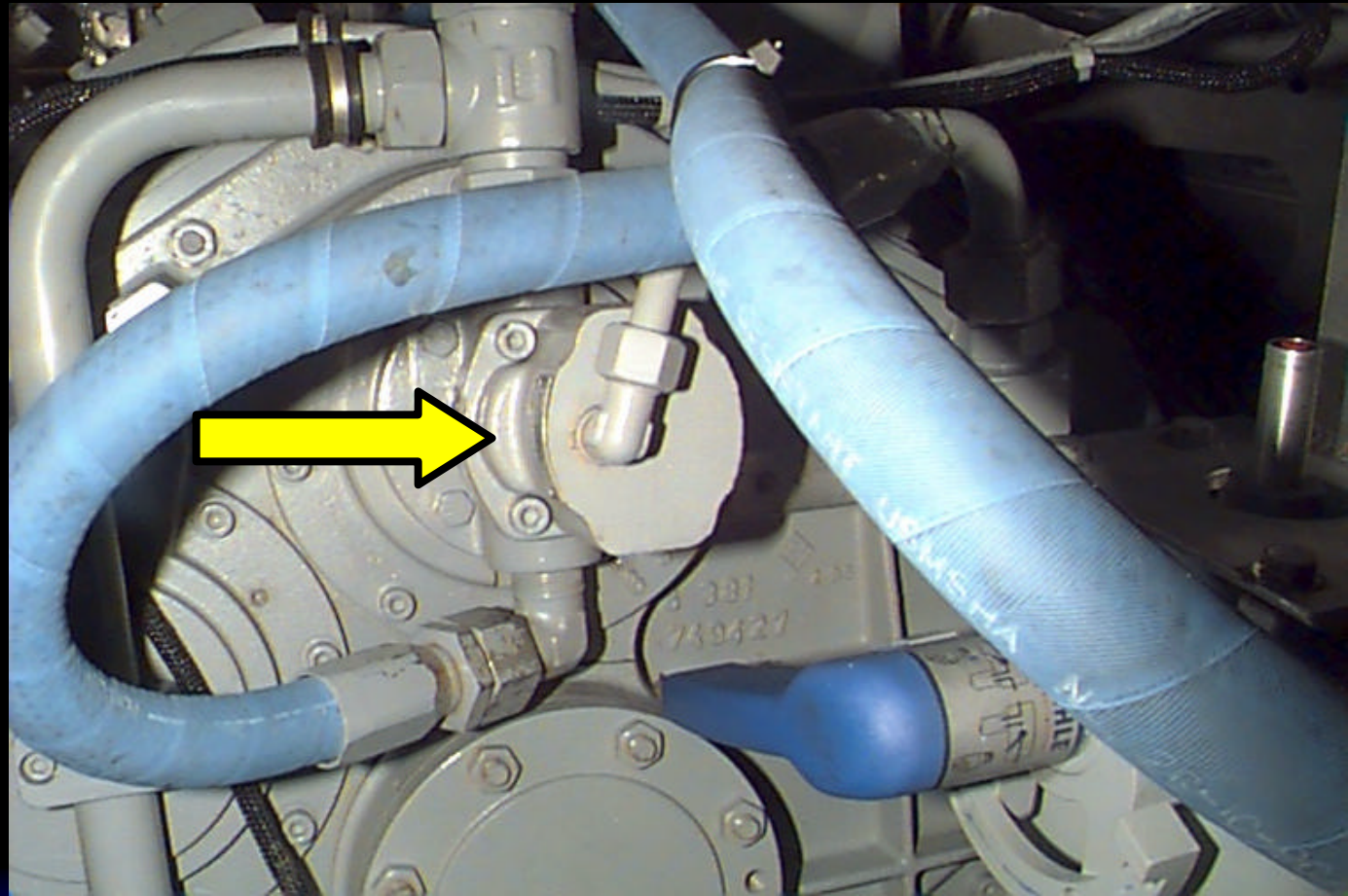
- ◆ Normal operating pressure:
  - 230 to 290 psi engaged
  - 58 to 66 psi disengaged
- ◆ Low oil pressure alarm 174 psi

# Oil Temperatures

- ◆ Normal operating temperatures  
140 to 176 deg. F
- ◆ High oil temp alarm 194 deg. F

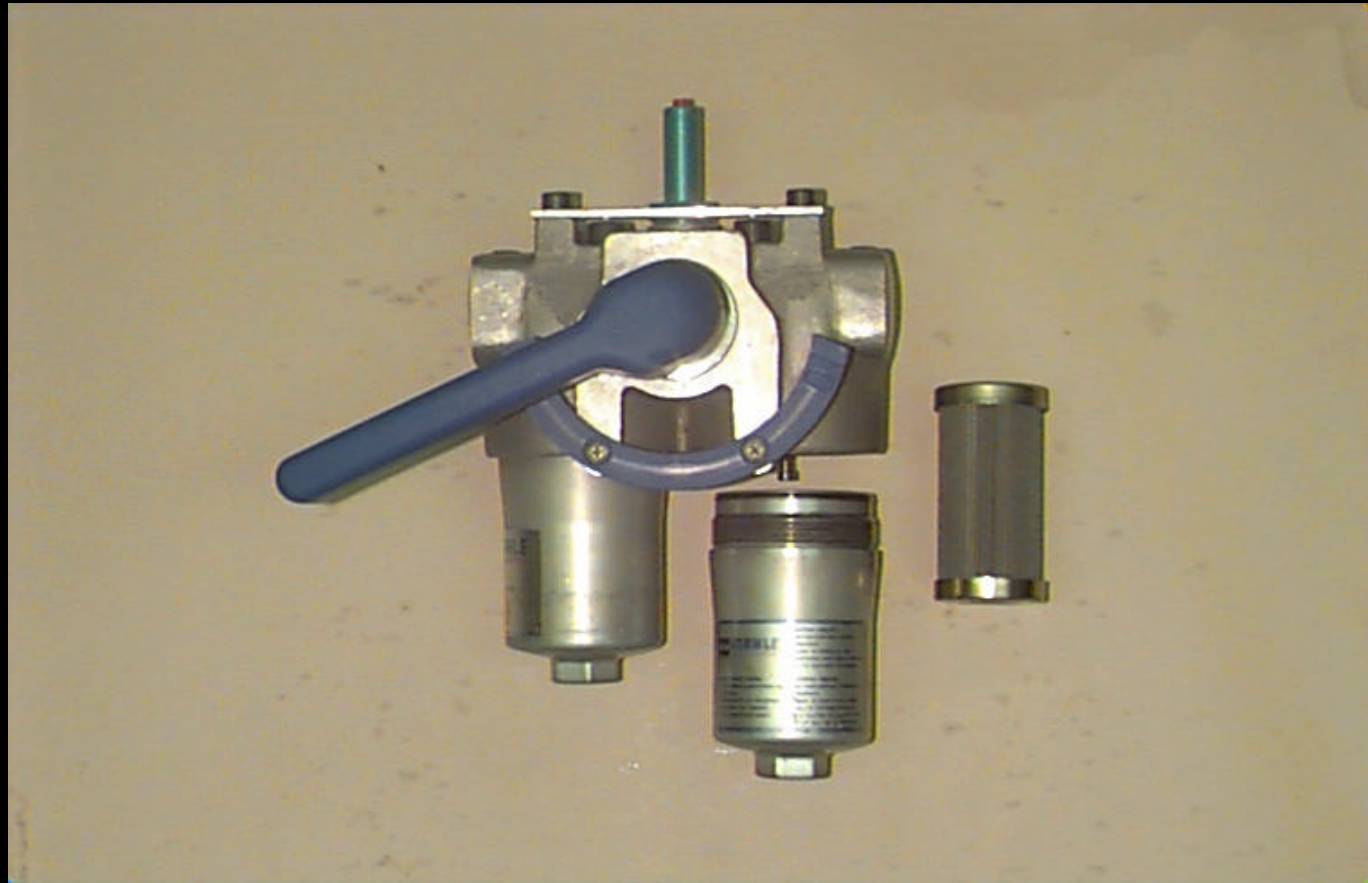
# Oil Pump

- ◆ Gear type
- ◆ Provides flow



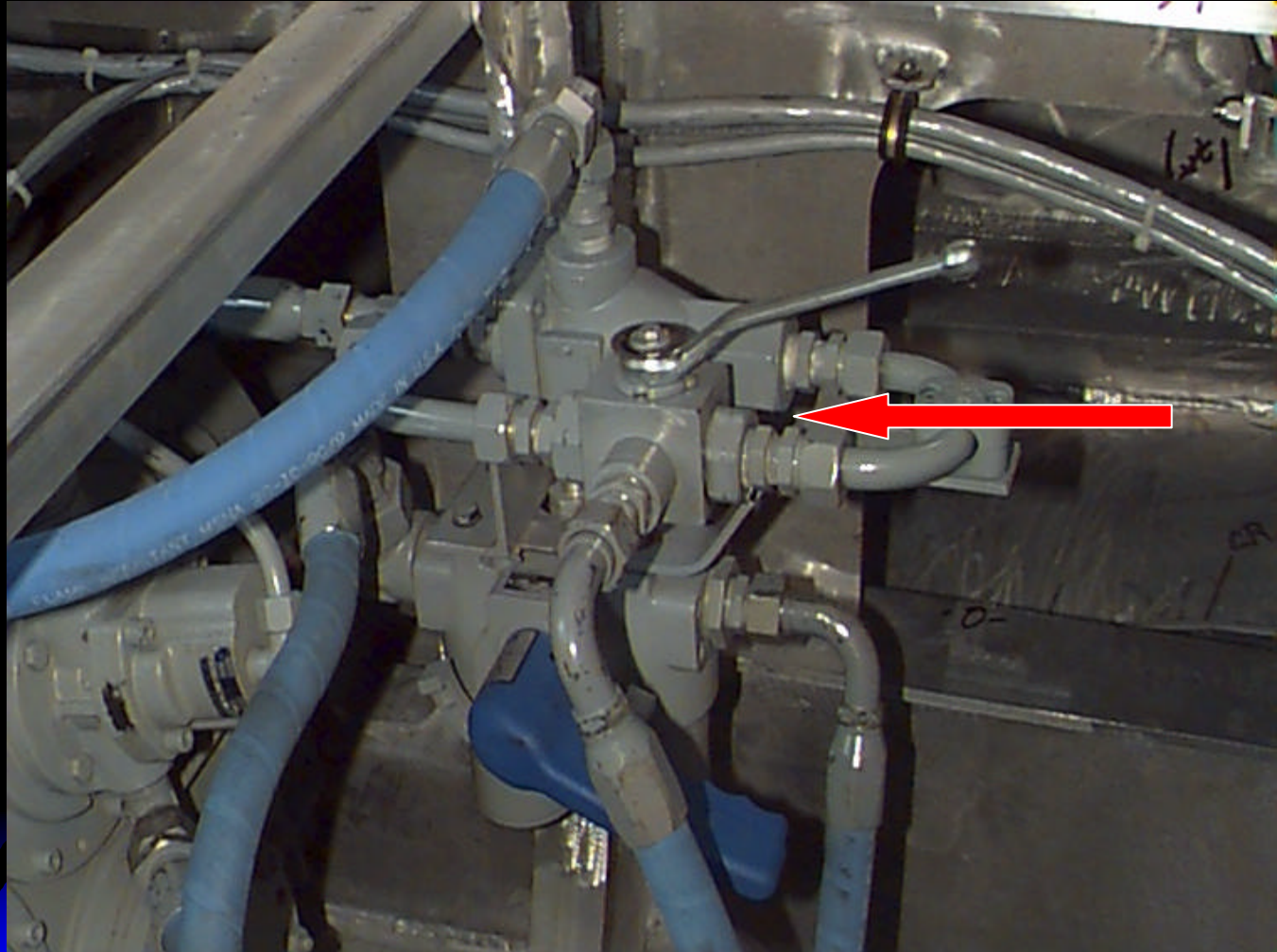
# Duplex Filter

- ◆ 2 position change-over lever
- ◆ Reusable mesh element (60 micron)
- ◆ Dirty filter indicator:
  - Mechanical pop-up button
  - 72 to 76 psi differential



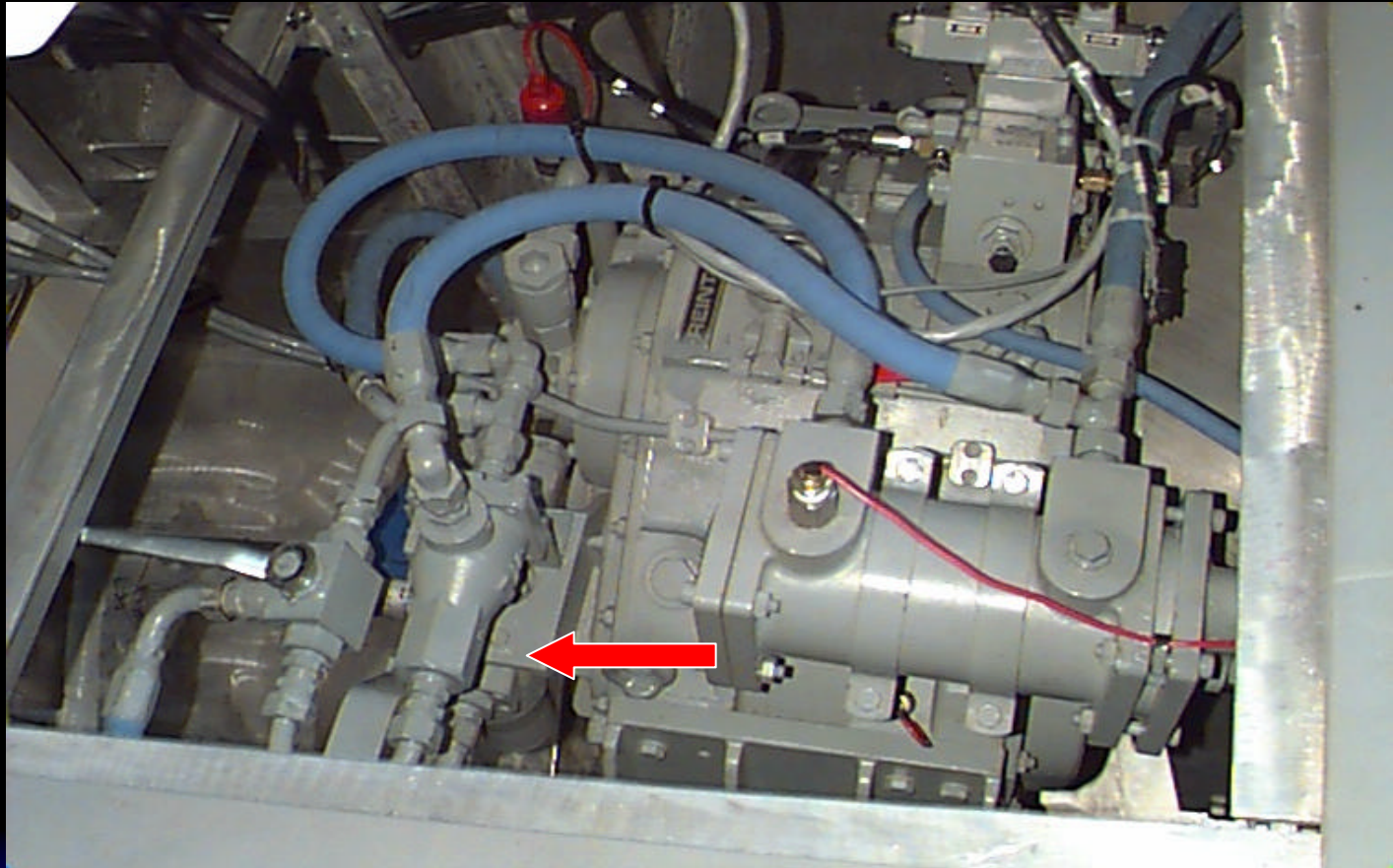
# Bypass Valve

- ◆ Used to divert flow around thermostatic valve in the event of failure



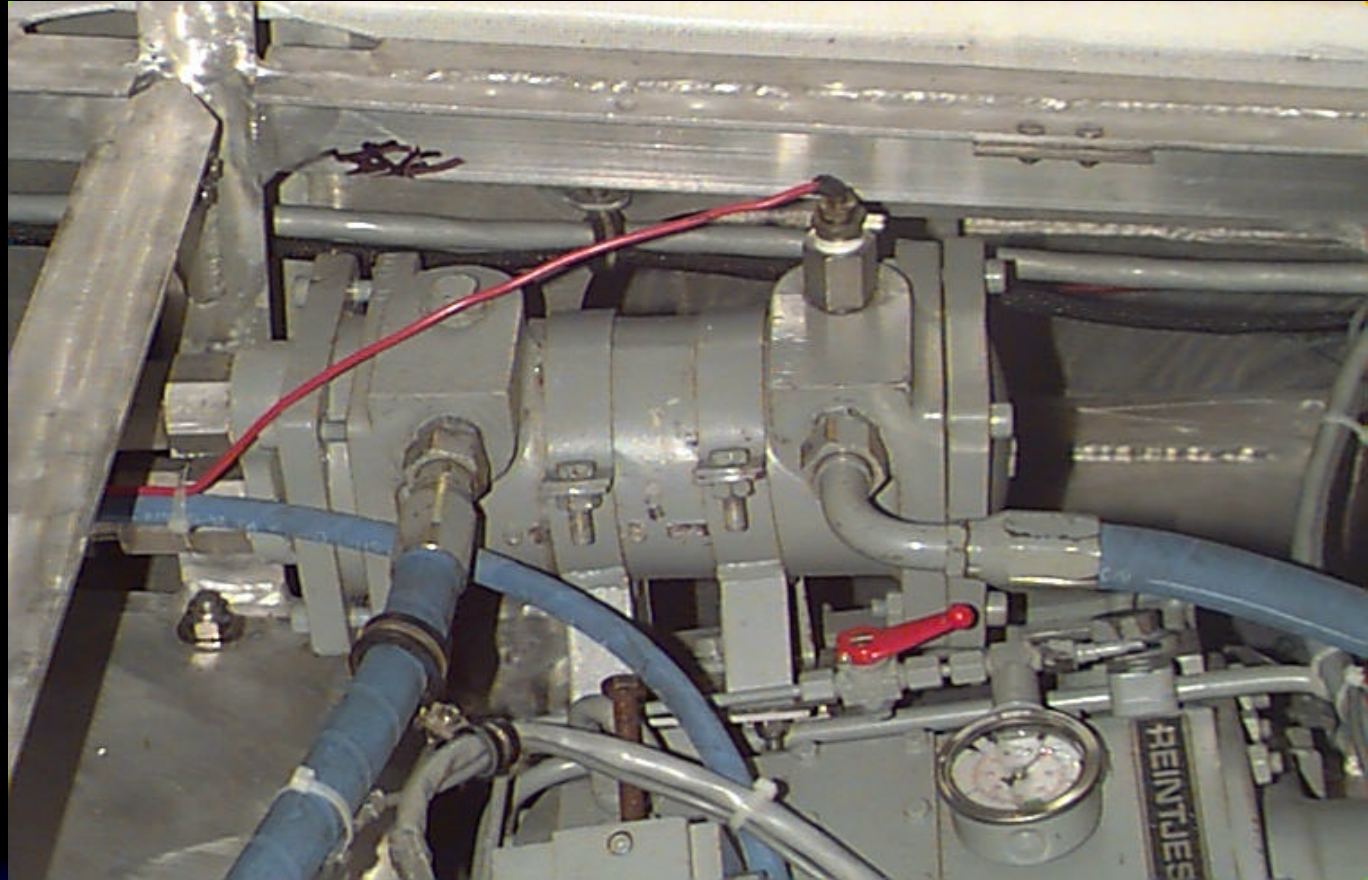
# Thermostatic Valve

- ◆ Maintains gear L/O temp.
- ◆ Bypasses cooler until temp. reaches 150 deg. F



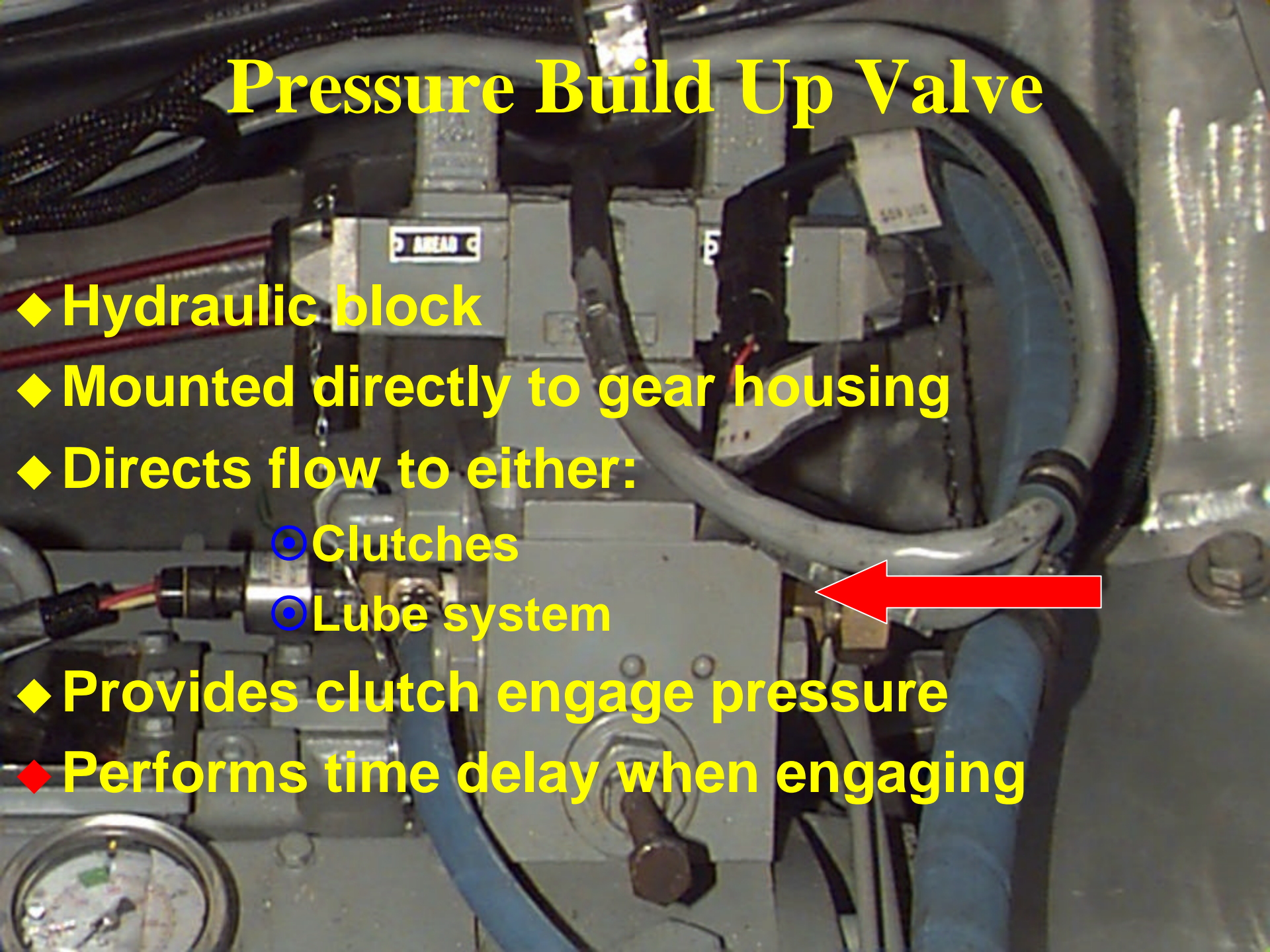
# Heat Exchanger

- ◆ Copper tube bundle
- ◆ Raw water cooled
- ◆ Cleanable



# Pressure Build Up Valve

- ◆ Hydraulic block
- ◆ Mounted directly to gear housing
- ◆ Directs flow to either:
  - Clutches
  - Lube system
- ◆ Provides clutch engage pressure
- ◆ Performs time delay when engaging



# Control Valve

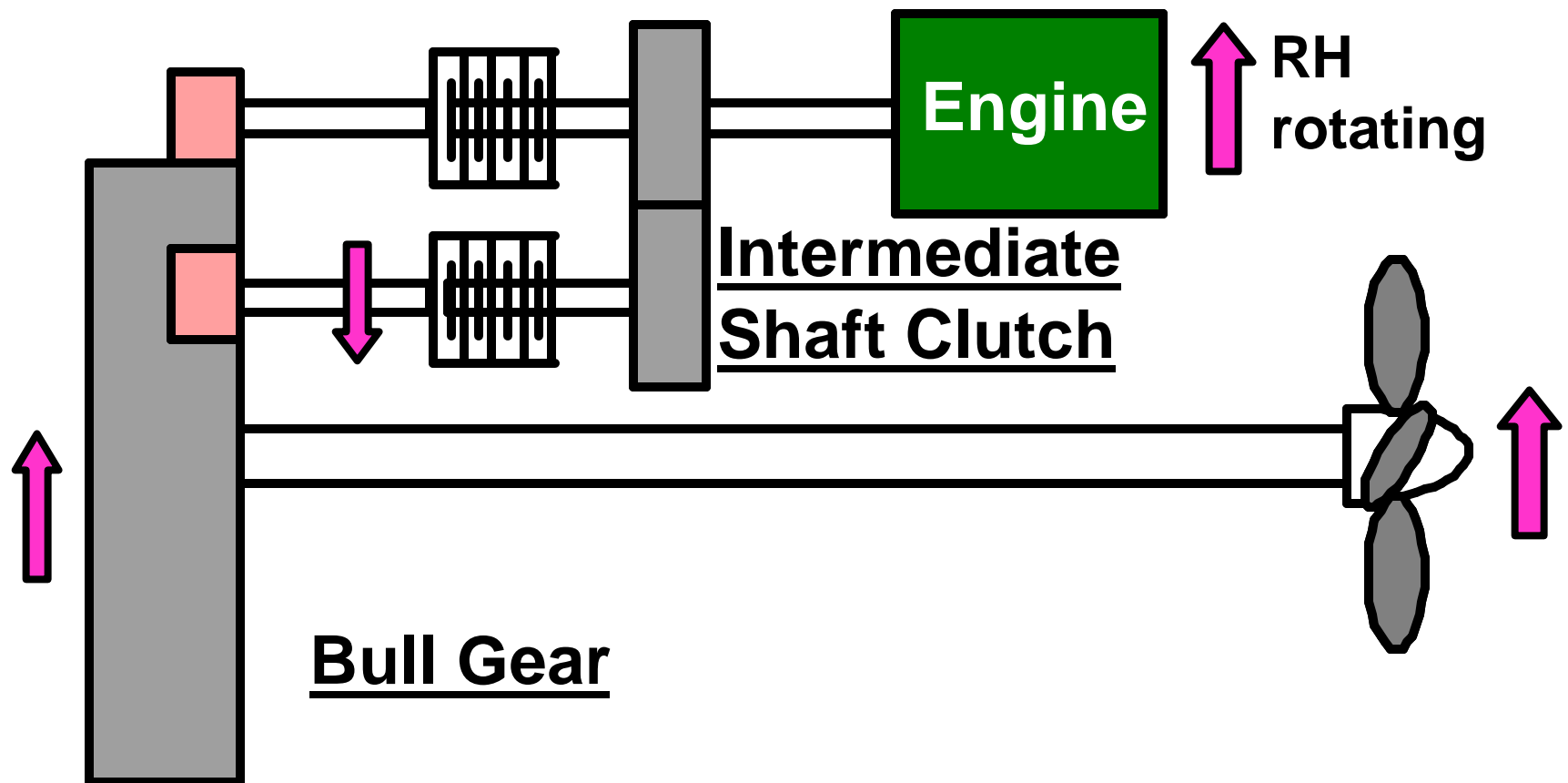
- ◆ 24V electrically actuated
- ◆ Axial sliding spool valve
- ◆ Neutral positioning spring returns
- ◆ Emergency manual actuation feature

# Gear Rotation

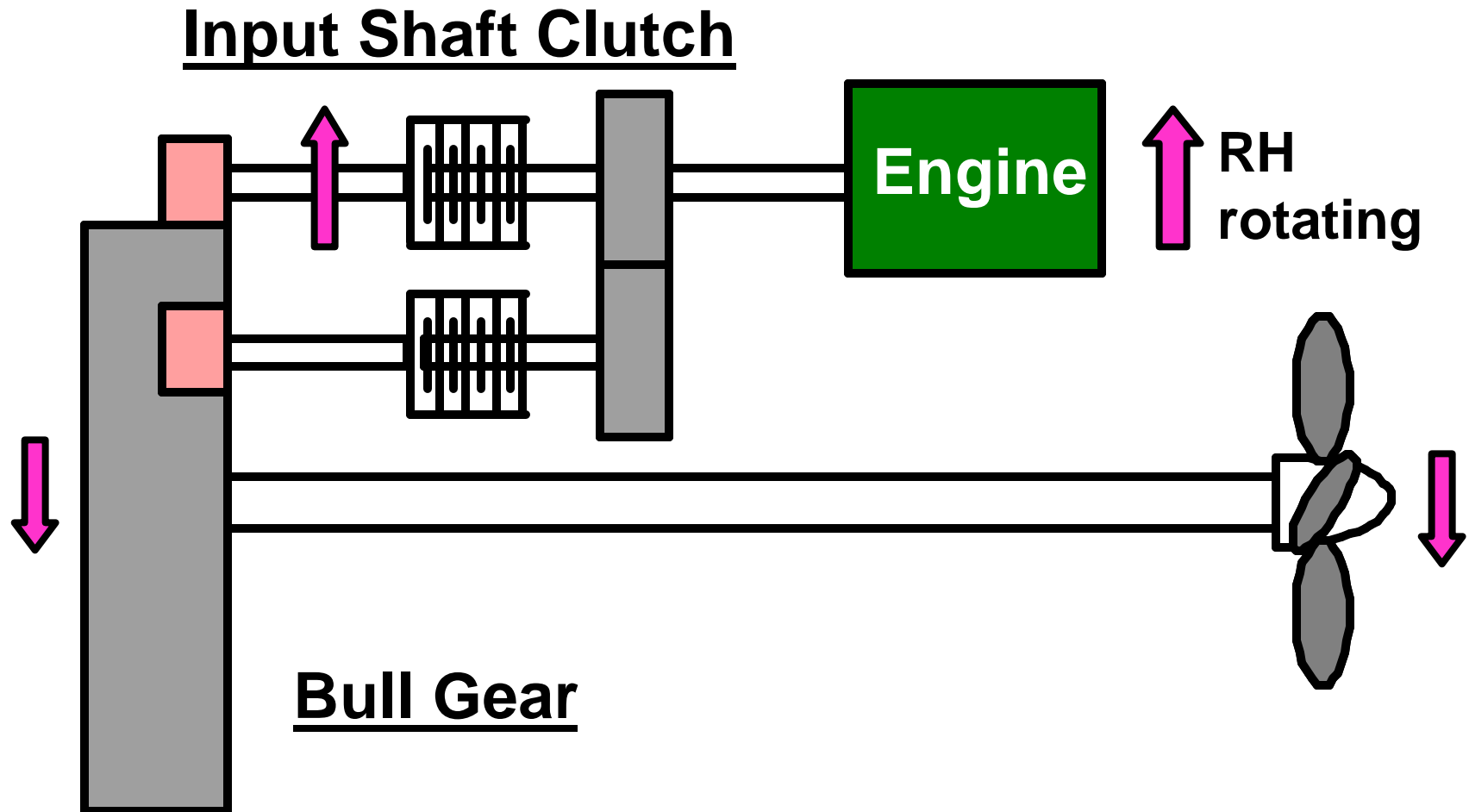
- ◆ Determined by oil line routing to clutch packs from PBV.  
Clutch packs are:
- ◆ Main input shaft clutch
- ◆ Intermediate shaft clutch

# Gear Rotation Stbd Engine

## FWD Identical



# Gear Rotation Port Engine FWD Opposite



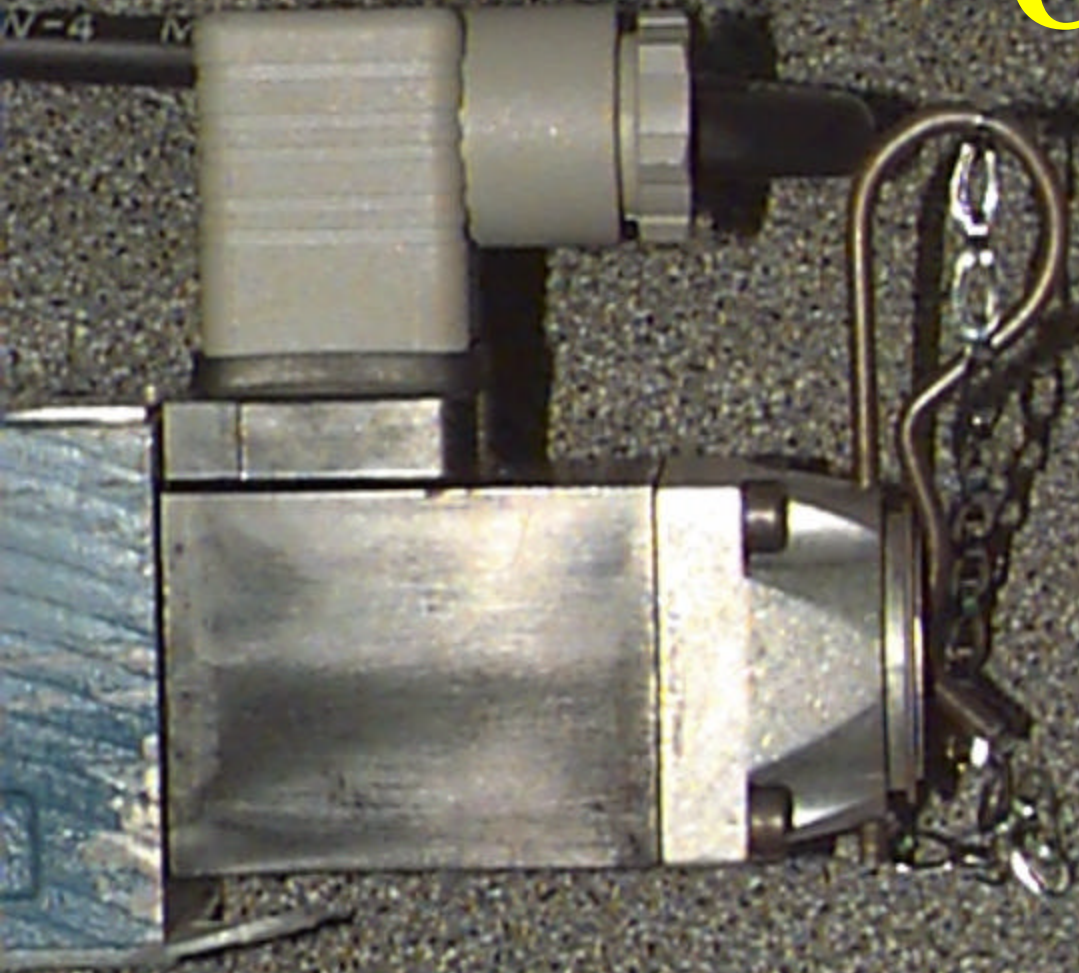
# Emergency Operation

- ◆ Two failure categories:
- ◆ Electric control failure
- ◆ Pressure oil supply failure

# Electric Control Failure

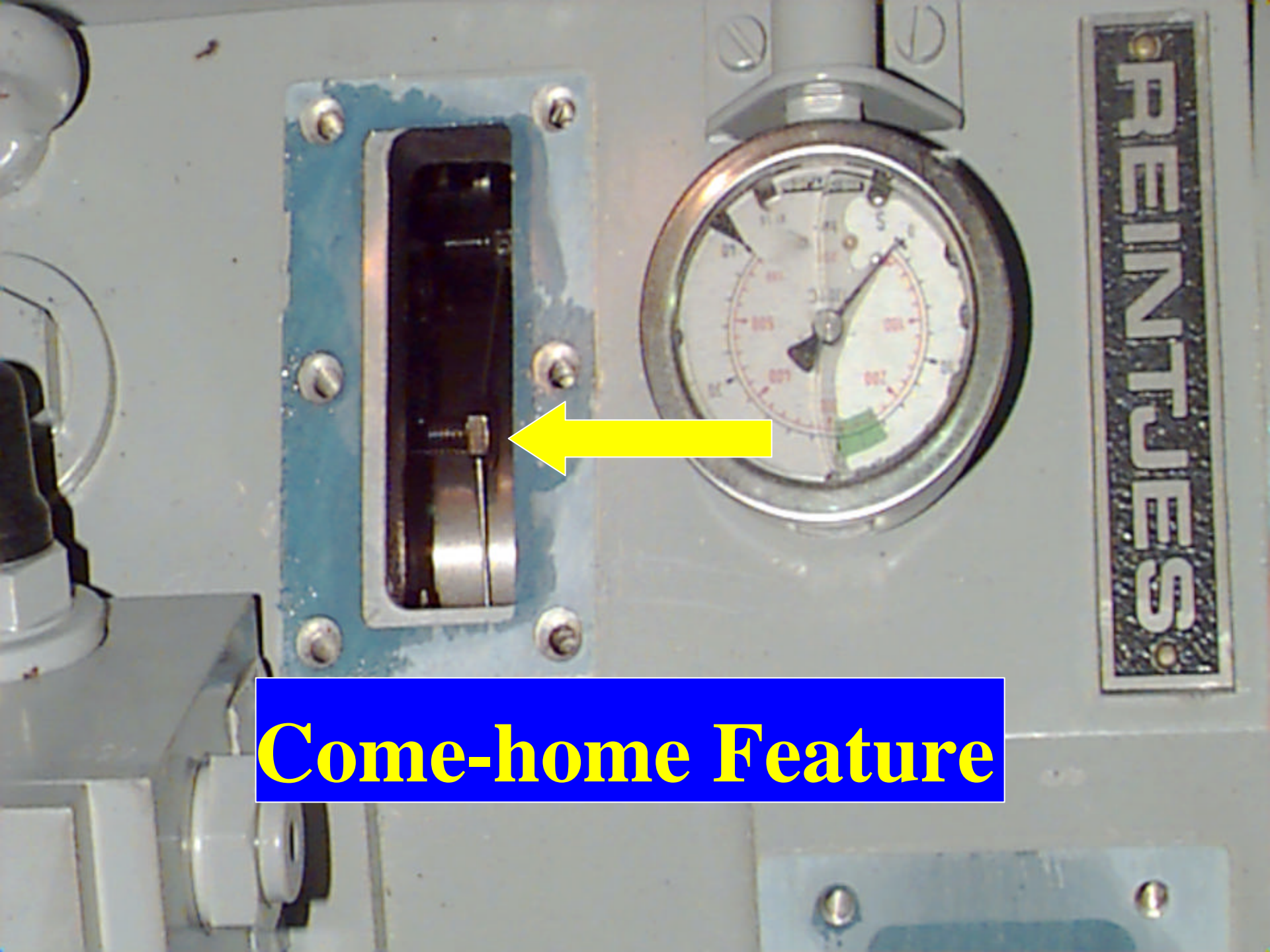
- ◆ Control valve can be operated manually
- ◆ Valve can be locked in either direction with attached pin
- ◆ NOTE: End boot must be removed prior to locking

# Control Valve Manual Operation



# Pressure Oil Supply Failure

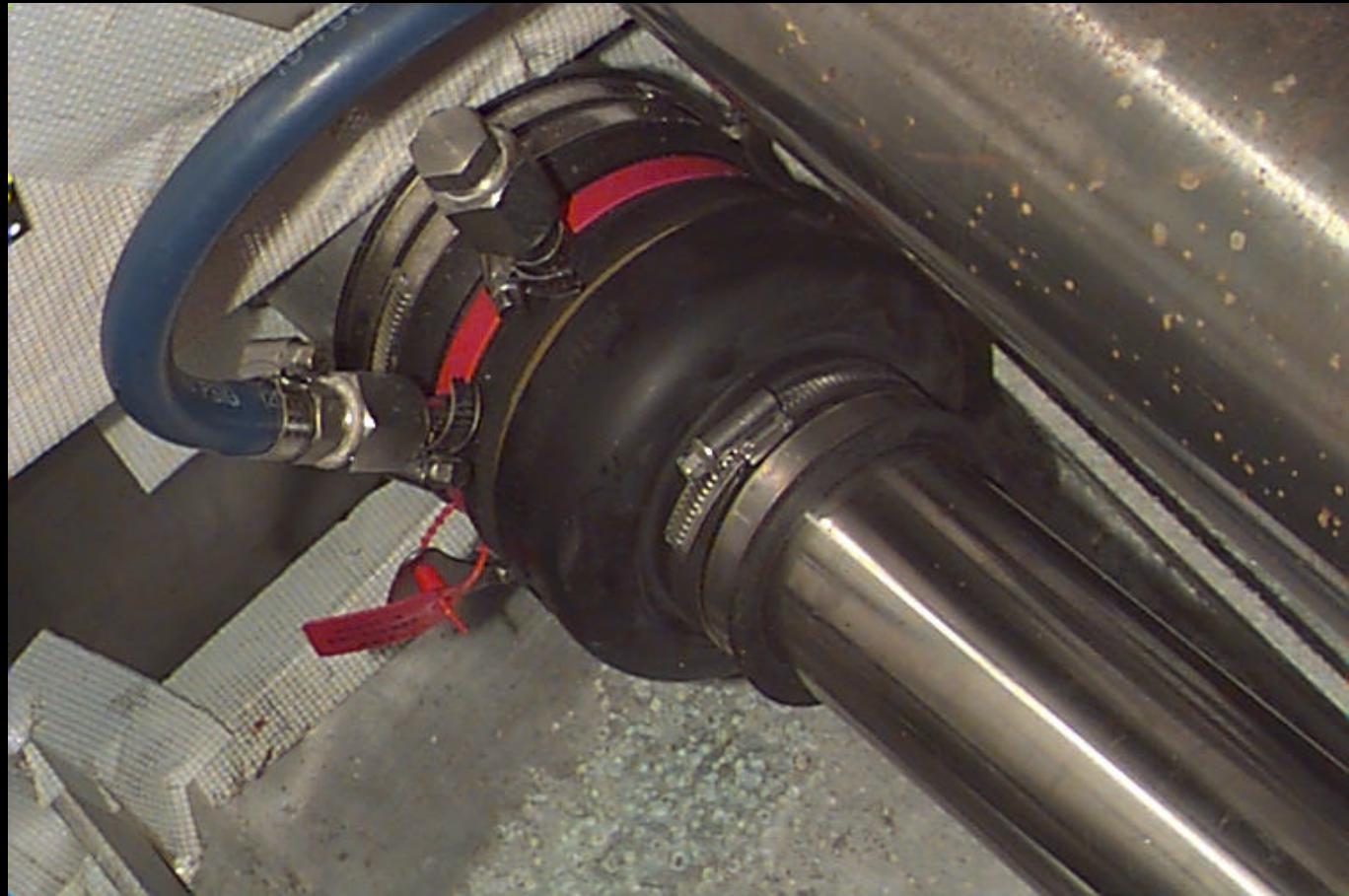
- ◆ “Come home” feature
- ◆ Must not operate over 70% rated speed



**Come-home Feature**

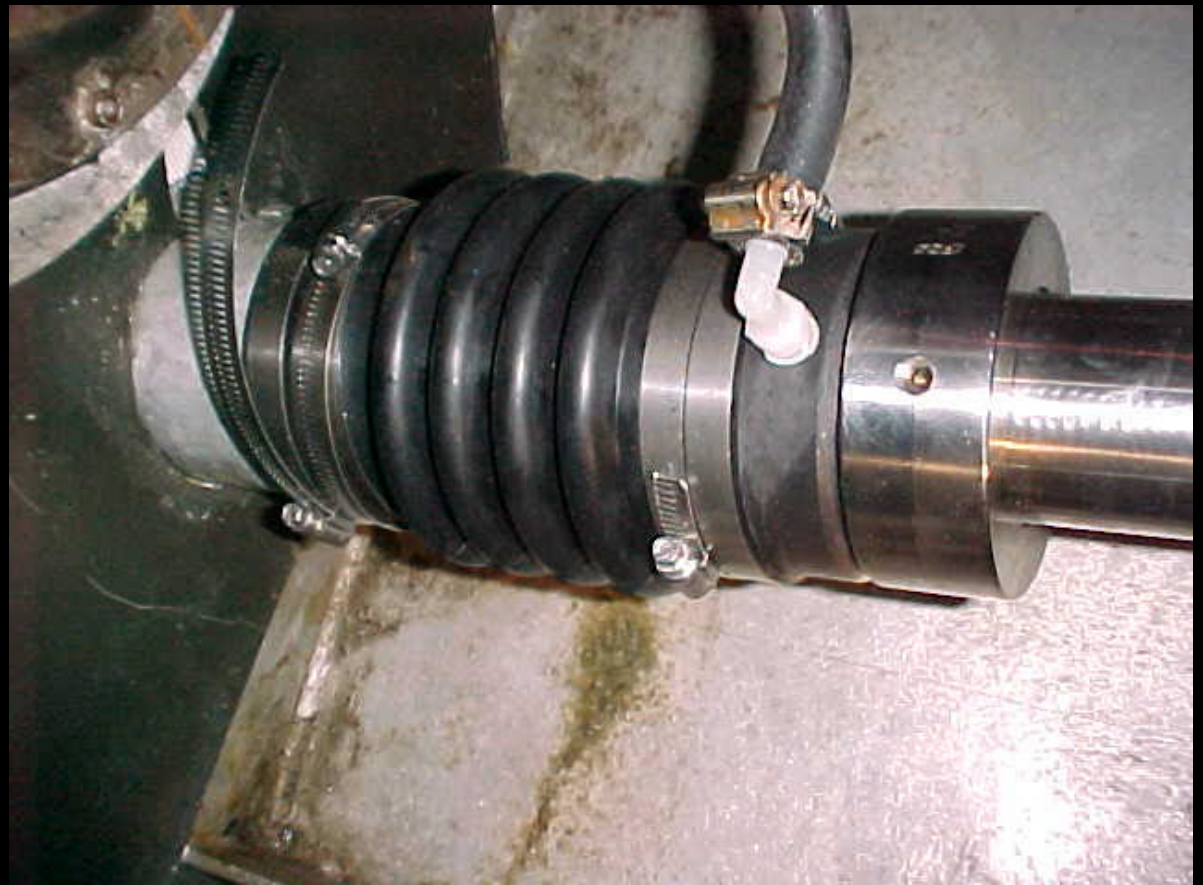
# Shaft Seal

- ◆ John Crane stern tube seal
- ◆ Mechanical seal
- ◆ Self adjusting
- ◆ Maintenance free
- ◆ Secondary backup seal for emergencies



# Shaft Seal

- ◆ PSS stern tube seal
- ◆ Mechanical seal
- ◆ Self adjusting
- ◆ Maintenance free



# Steering System

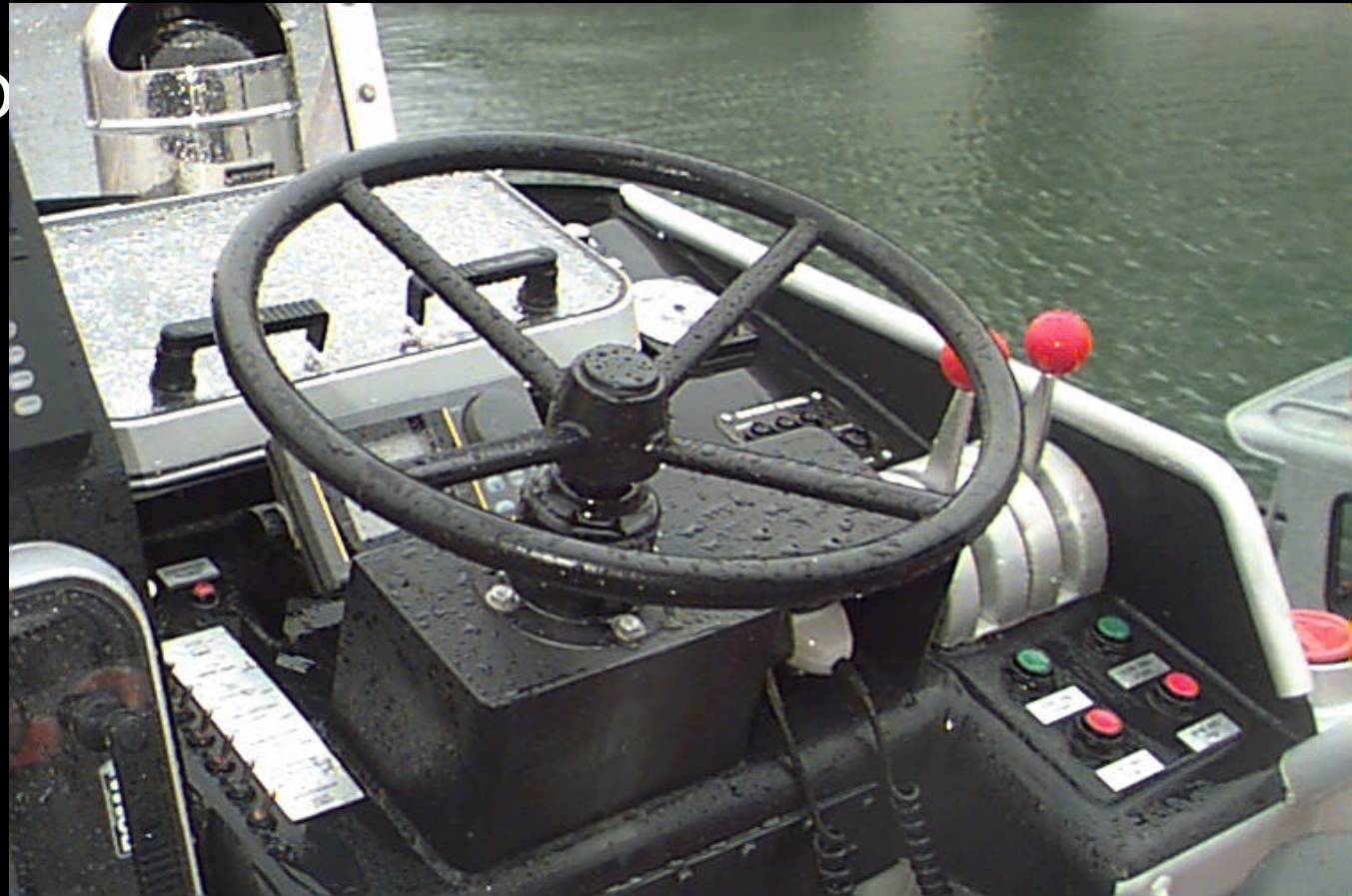


# System Components

- ◆ Helm unit
- ◆ Joystick
- ◆ Reservoir
- ◆ Steering pump
- ◆ Filter
- ◆ Cooler
- ◆ Steering control valve
- ◆ Power cylinder
- ◆ Feed back units
- ◆ Auto pilot pump
- ◆ Rudders
- ◆ Steering pressure alarms

# Helm Unit

- ◆ Rotary pump
- ◆ Supplies oil to a servo cylinder



# Joystick

- ◆ Single axis
- ◆ Call up button to energize
- ◆ Sends signal to steering control valve



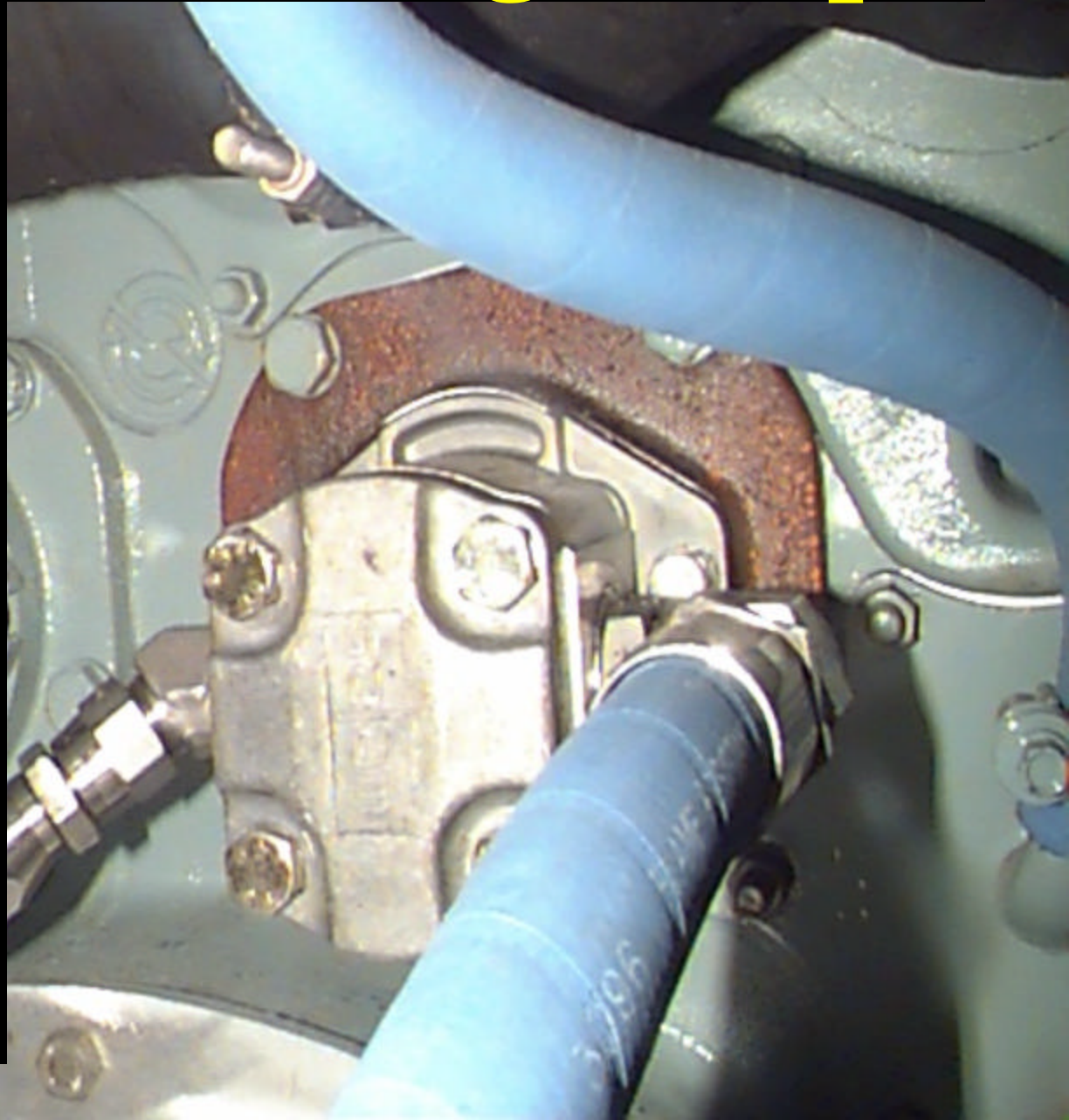
# Reservoir

- ◆ 1 gallon capacity
- ◆ Tellus T-15 hydraulic fluid
- ◆ Sight glass
- ◆ Pressurized to 20 - 30 psi
- ◆ Pressure gauge



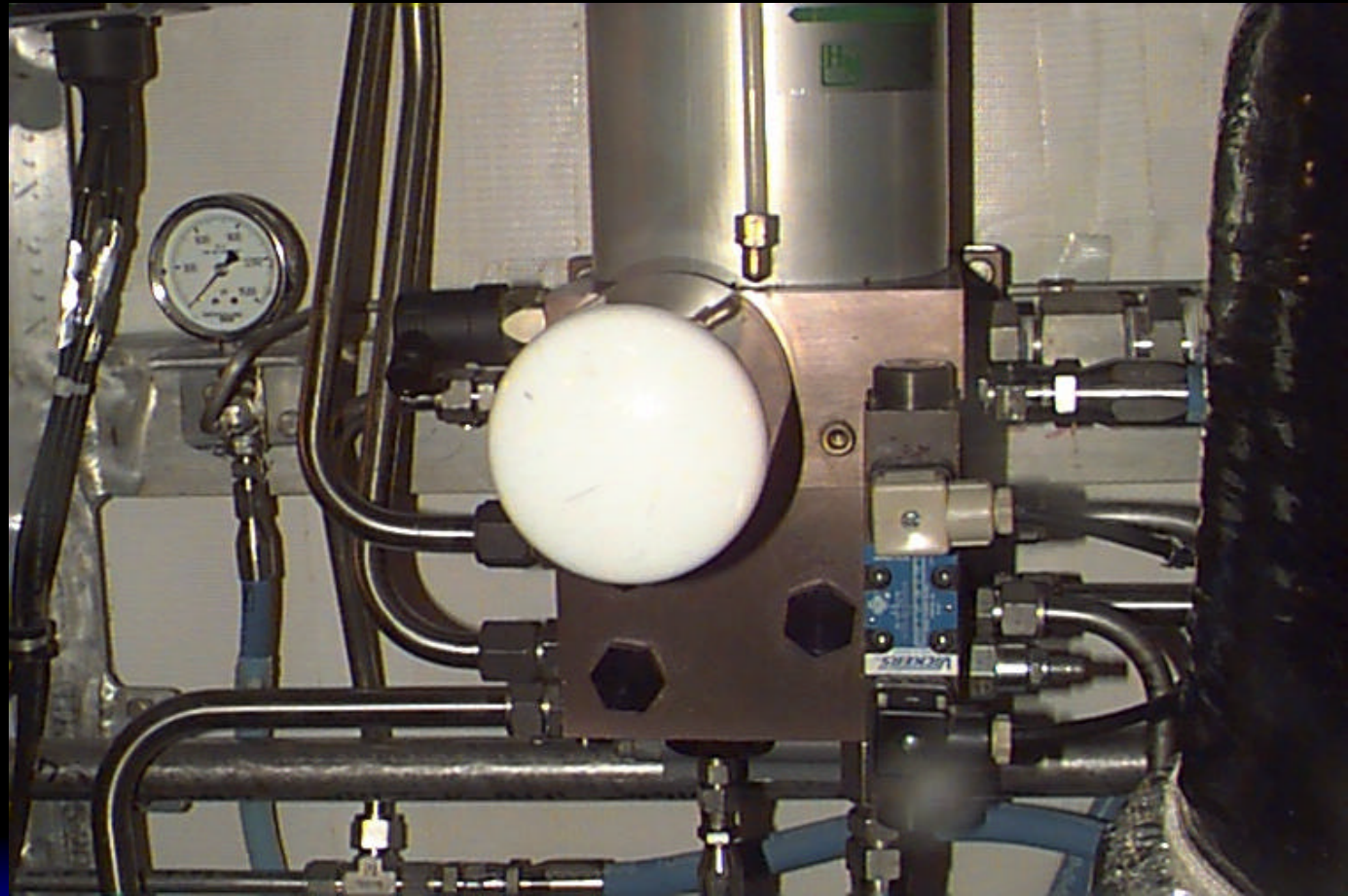
# Steering Pump

- ◆ Pump on each engine
- ◆ Provides pressure for steering system
- ◆ Pressure is regulated by a flow control valve
- ◆ Develops pressure in power circuit to change rudder position
- ◆ Under steady conditions, pump circulates oil freely in power circuit



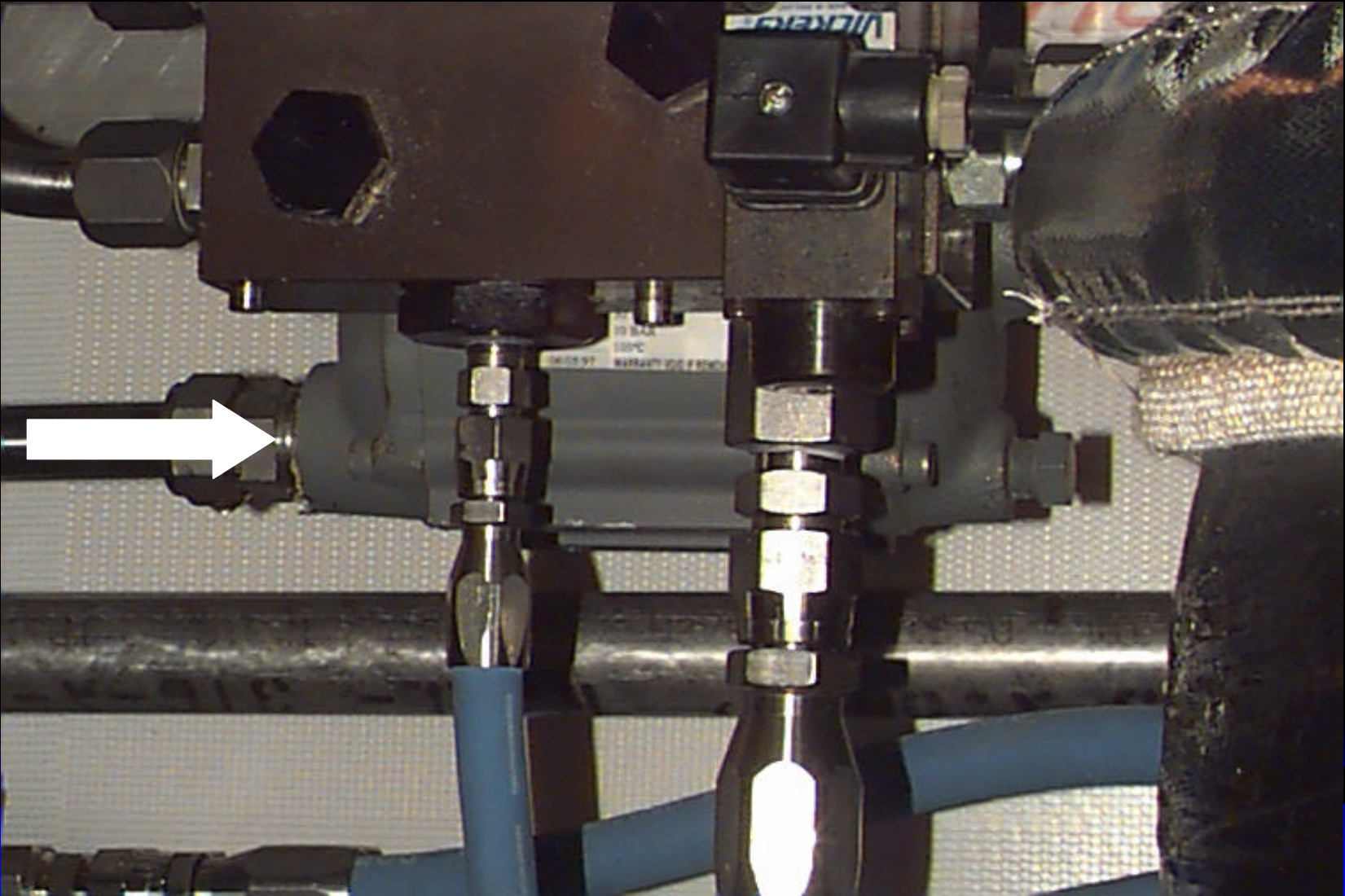
# Filter

- ◆ Spin on
- ◆ Filters oil flowing into reservoir
- ◆ Built in bypass



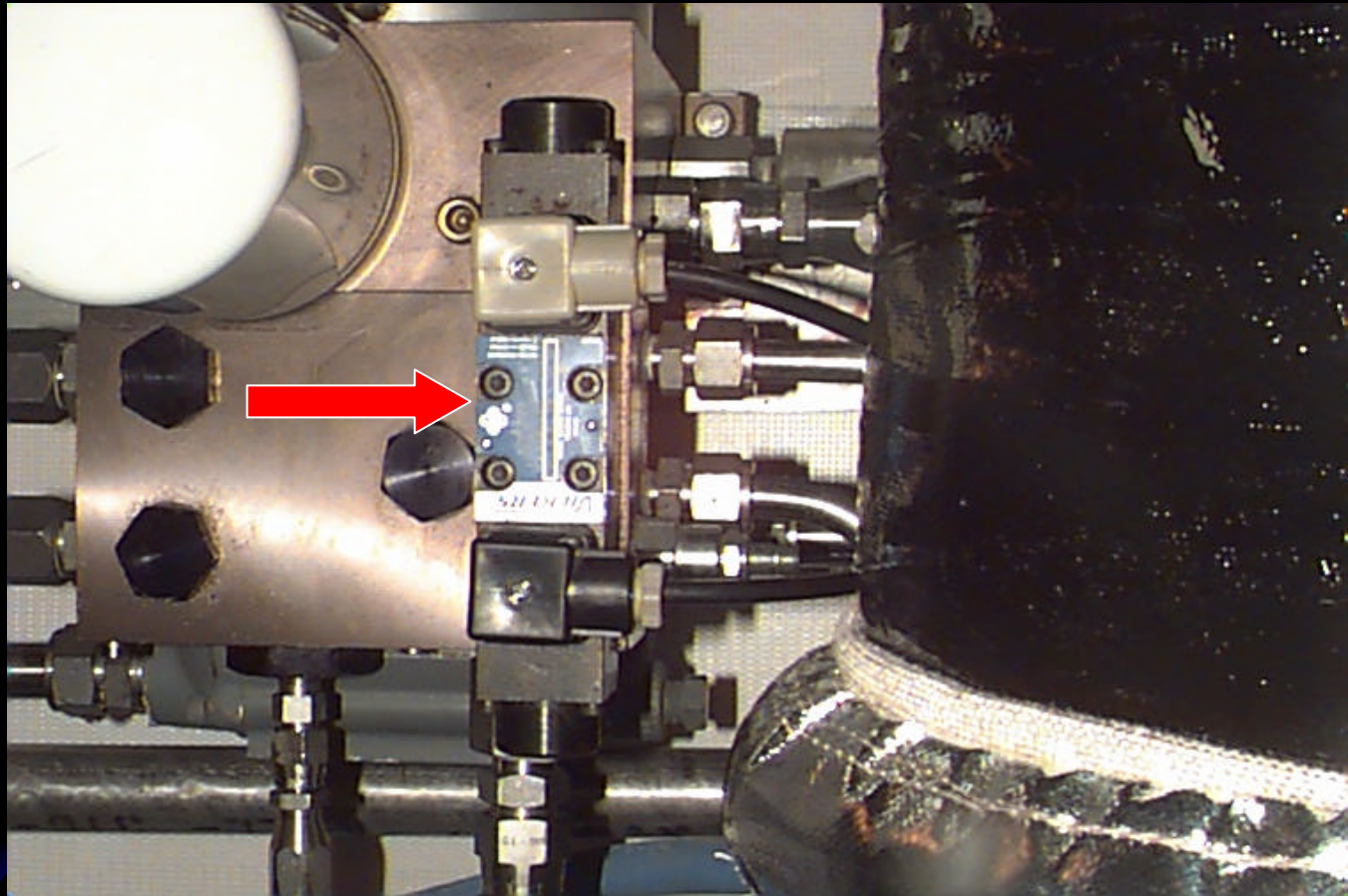
# Cooler

- ◆ Maintains proper system temperature

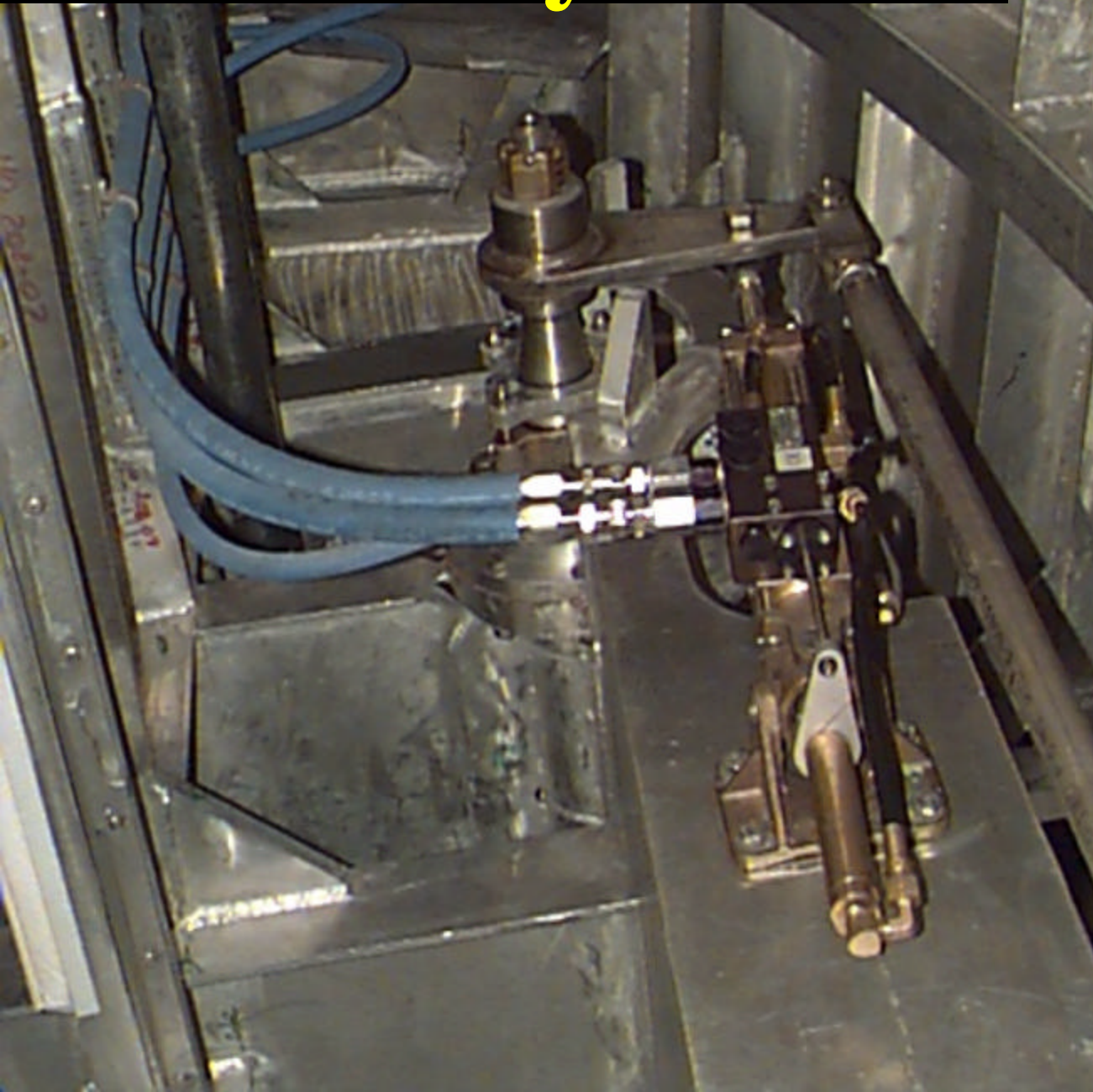


# Steering Control Valve

- ◆ Sliding spool valve
- ◆ Electrically operated from joysticks



# Power Cylinder



- ◆ Attaches to STBD tiller
- ◆ Can produce a thrust up to 3500 lbs.
- ◆ Internal valve assembly that limits pressure to 950 psi. in manual circuit
- ◆ Provides an automatic return to manual steering if power pump flow is not available

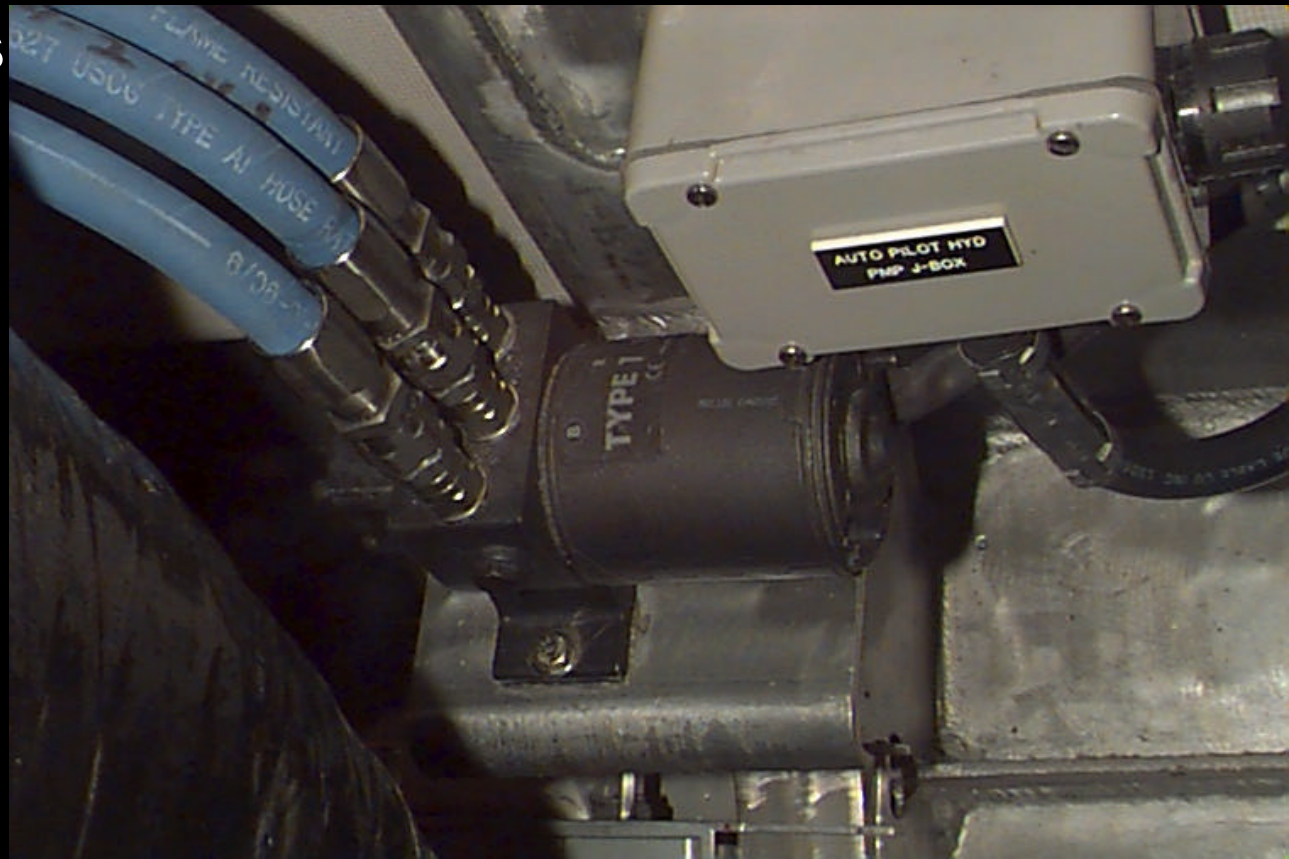
# Feedback Units

- ◆ Connected to port tiller
- ◆ Works as a potentiometer
- ◆ Provides feedback to steering system and rudder angle indicators
- ◆ Provides feedback to autopilot



# Autopilot Pump

- ◆ Autopilot pump is connected to the helm unit lines
- ◆ Commands are issued by the autopilot course computer



# Rudders

- ◆ Stainless steel spade type
- ◆ Stainless steel rudder stock
- ◆ Rudders move 70 deg. port to stbd



# Steering Pressure Alarms

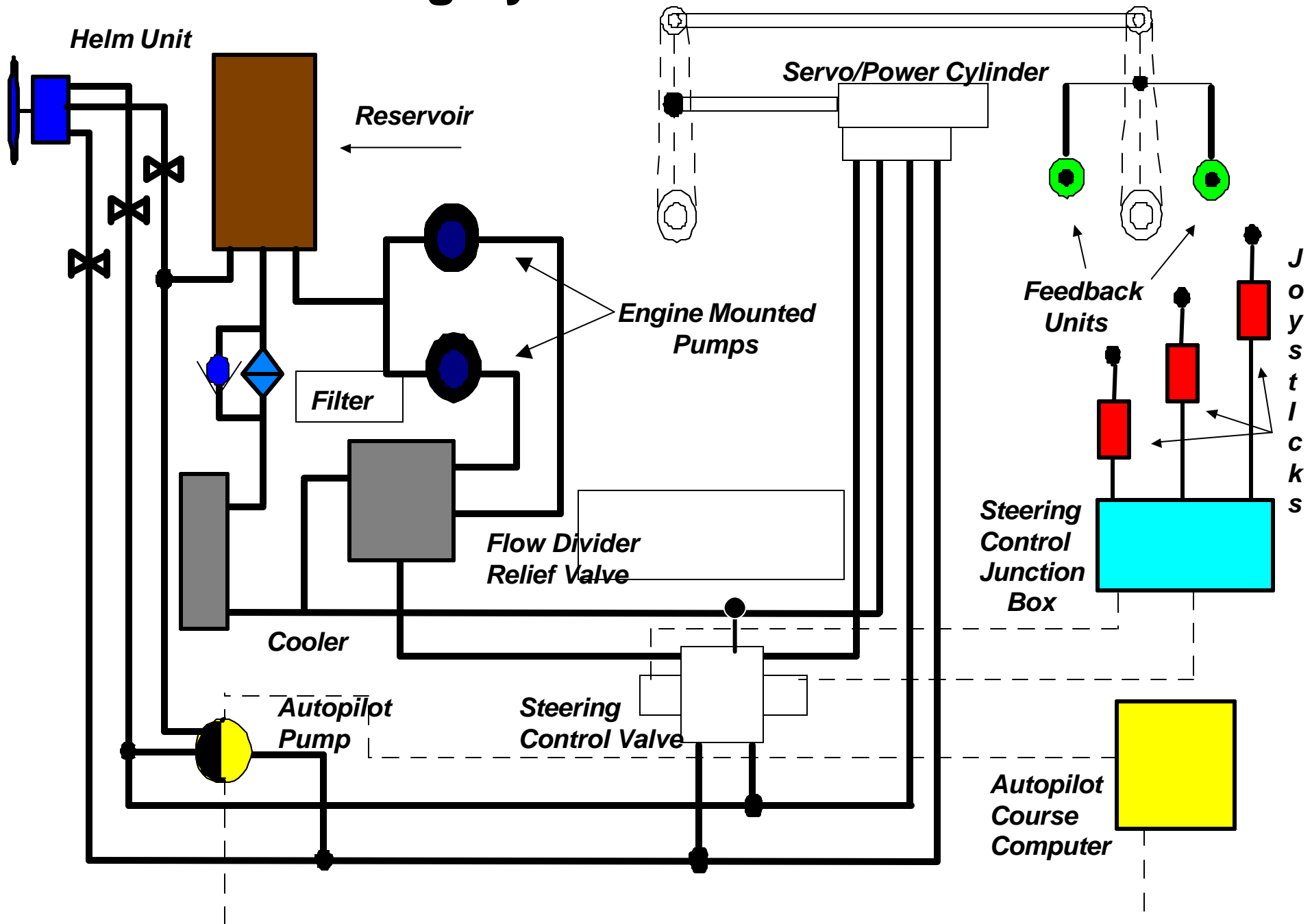
STEERING GEAR  
LOW PRESS



- ◆ Alarm is set at 45 psi
- ◆ Alarms are located:
  - Enclosed Bridge overhead console
  - Open Bridge center console

ELECTRONIC CONTROLS

# Steering System



# Heating Ventilation Air Condition (HVAC)

# System Components

- ◆ Sea valve
- ◆ Strainer
- ◆ R/W pumps
- ◆ R/W system piping
- ◆ Self contained units
- ◆ Control panel
- ◆ Compartment ventilation

# HVAC Raw Water System

*Enclosed Bridge  
Compartment Unit*

*Survivor's Compartment  
Unit*

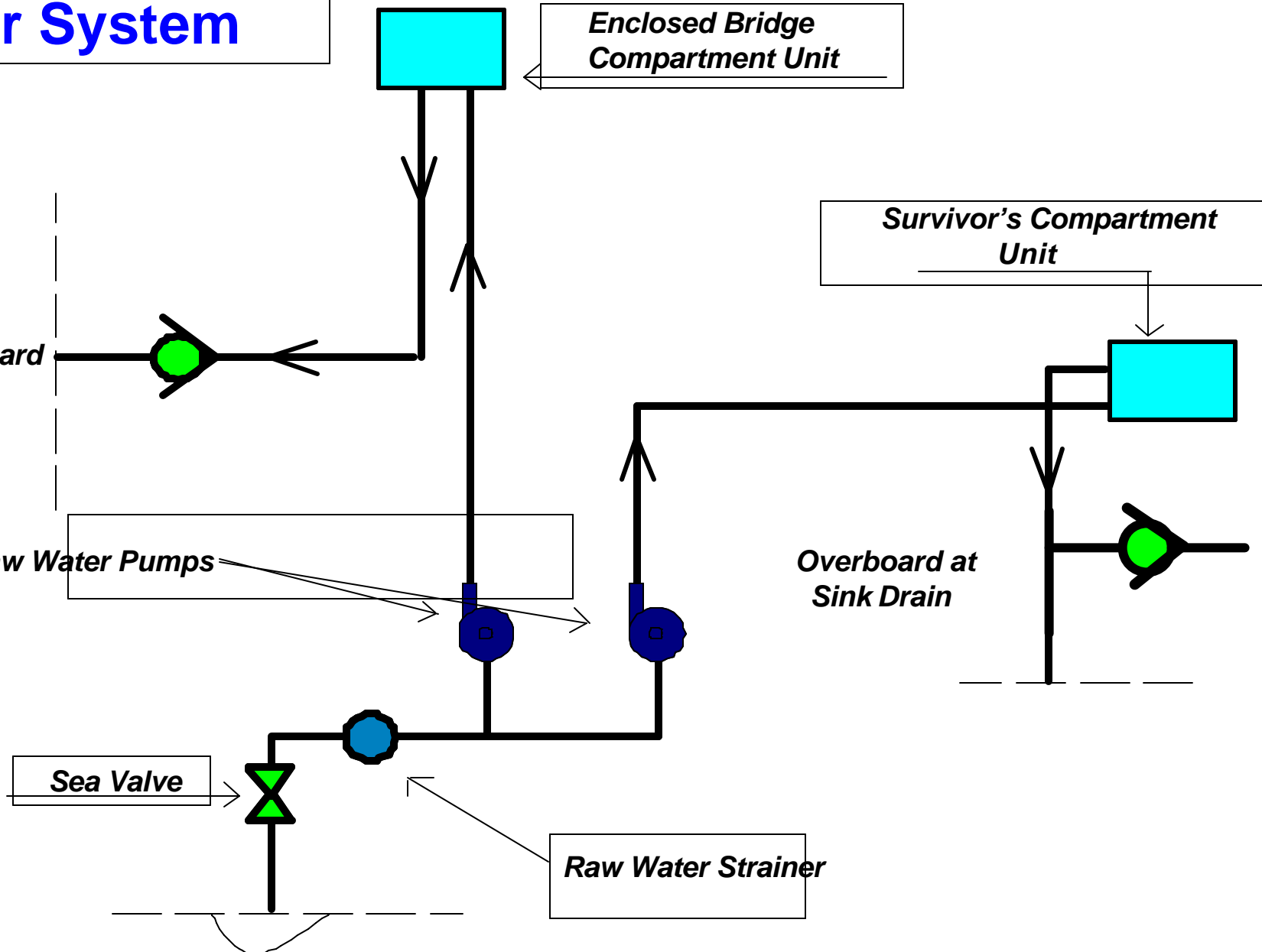
*Overboard*

*Raw Water Pumps*

*Overboard at  
Sink Drain*

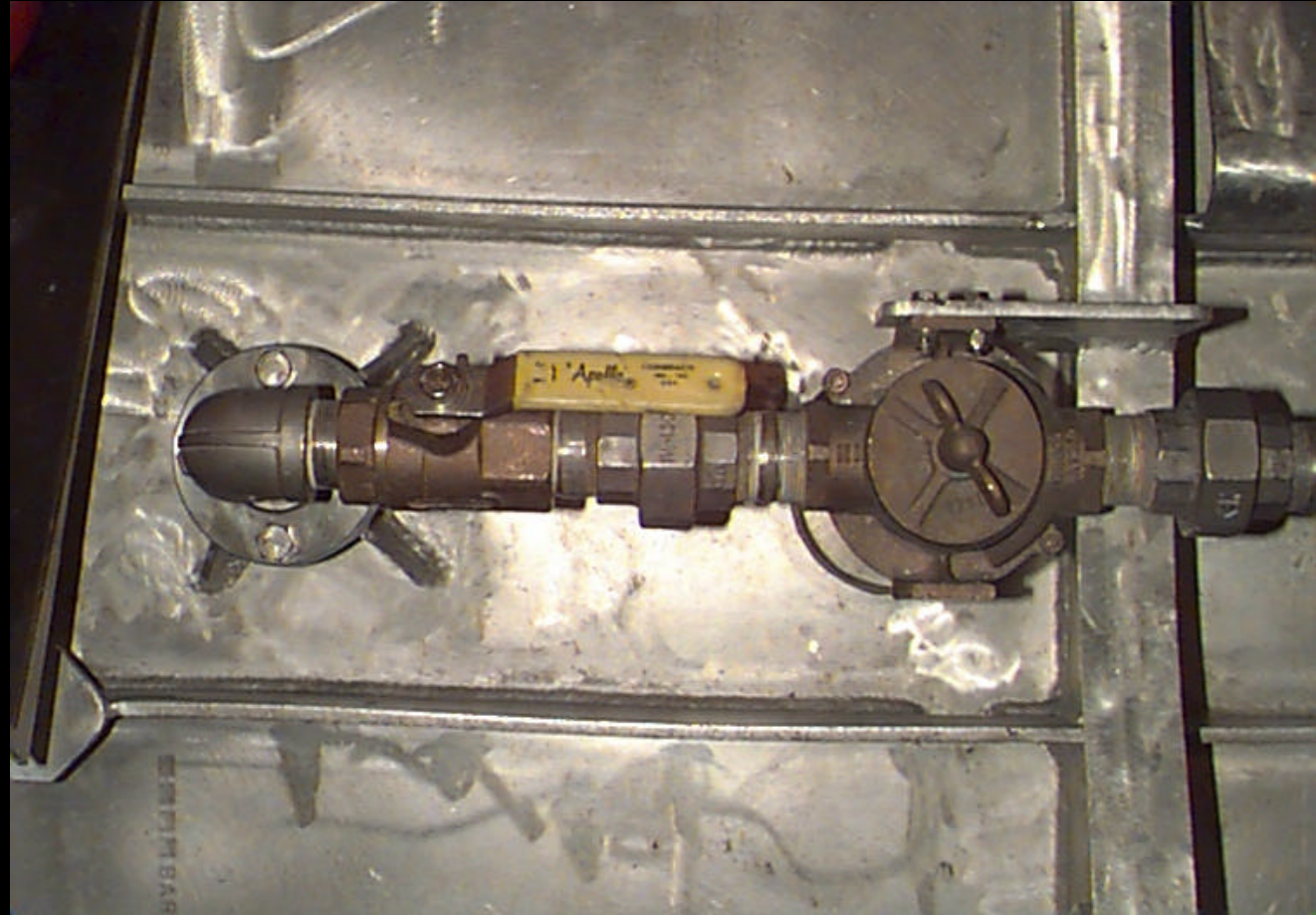
*Sea Valve*

*Raw Water Strainer*



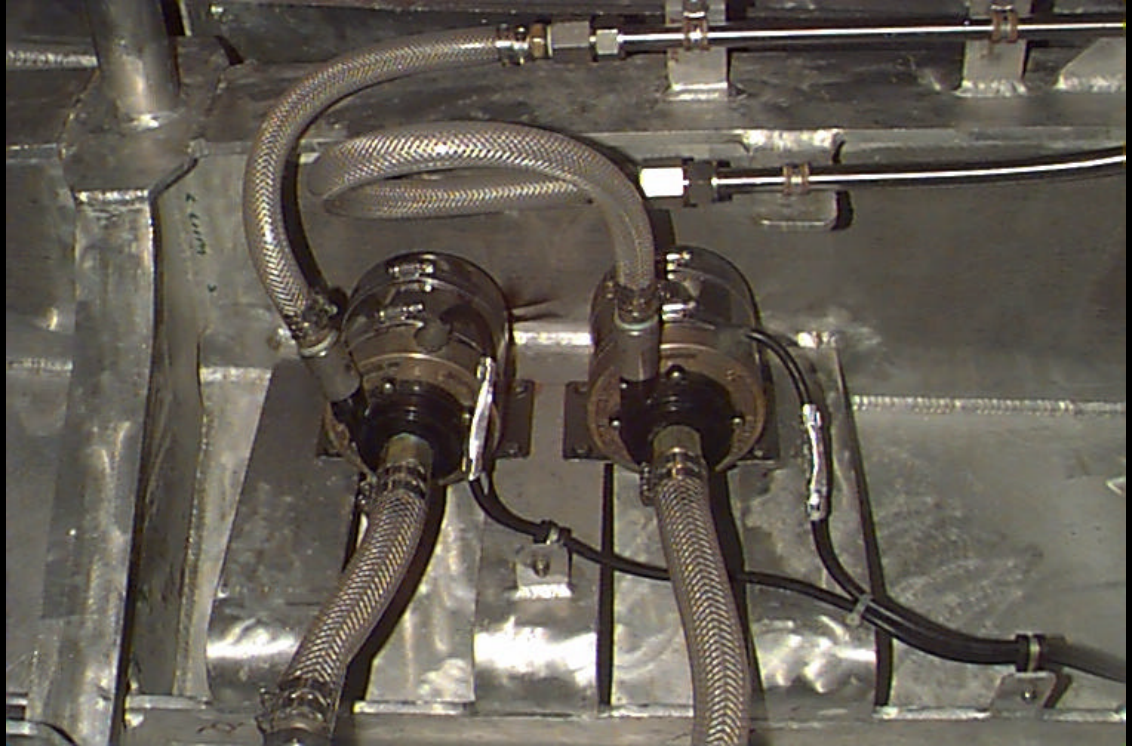
# Sea Valve And Strainer

- ◆ 1/4 turn ball valve
- ◆ Simplex strainer



# Raw Water Pumps

- ◆ Pump for each unit
- ◆ 115 VAC
- ◆ 1/12 Hp.
- ◆ 390 GPH

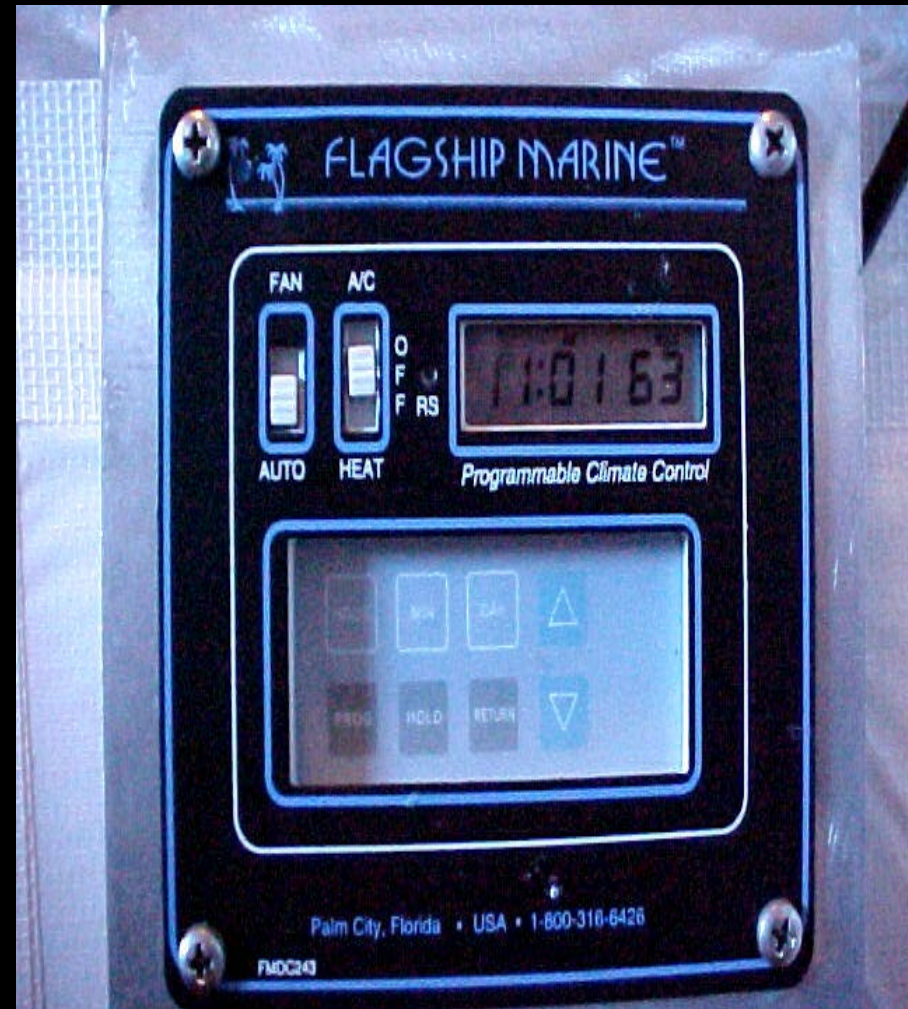


# Self Contained Units

- ◆ Contains all A/C components
- ◆ 115 VAC
- ◆ 1.375 ton unit (16,000 BTU)
- ◆ 8 oz. charge R-22
- ◆ Internal heating element
- ◆ Uses R/W system in cooling mode
- ◆ Energized by either shore power or sea power generators
- ◆ Unit circulates air in compartment



- ◆ Digital display and keypad
- ◆ Located in:
  - Enclosed Bridge
  - Survivors' compartment
- ◆ Controls cool or heat modes
- ◆ Operates constantly in fan mode
- ◆ Thermostat controlled in auto mode
- ◆ Programmable climate control



**Note: Whenever the Self  
Contained Units are  
operated in the cooling mode  
the sea valve must be opened**

# Compartment Ventilation

- ◆ All major compartments have fresh air natural ventilation
- ◆ Forepeak and lazarette are vented through a 2" check ball
- ◆ Forward compartment uses a dorade vent

# Aux. Machinery Space Ventilation



- ◆ A ventilation fan is used to remove battery fumes
- ◆ The fan cycles on whenever the batteries are being charged

# CO2 Fire Suppression System



# SYSTEM COMPONENTS

- ◆ 3 Mechanical actuators
- ◆ Two 25 lb CO2 bottles
- ◆ 30 second delay cylinder
- ◆ Discharge siren
- ◆ 2 electrical pressure switches
- ◆ 1 mechanical pressure switch
- ◆ Multi-jet discharge nozzle

# CO2 System Actuators

- ◆ Charge circuit activated by a nitrogen cylinder
- ◆ Depressing plunger punctures seal
- ◆ 3 locations:
  - ▣ Enclosed Bridge
  - ▣ Open Bridge
  - ▣ Survivors' compartment



# C02 Bottles

- ◆ Two 25 lb bottles
- ◆ N2 charge activates first bottle
- ◆ C02 pressure from 1st bottle activates 2nd bottle
- ◆ C02 pressure activates elect. switches and siren



# Pressure Switch #1

- ◆ Electrically activates:
  - CO2 pre-discharge light (red)
  - Strobe light in engine room
  - Engine shut-down solenoids



# C02 Engine Pre-discharge



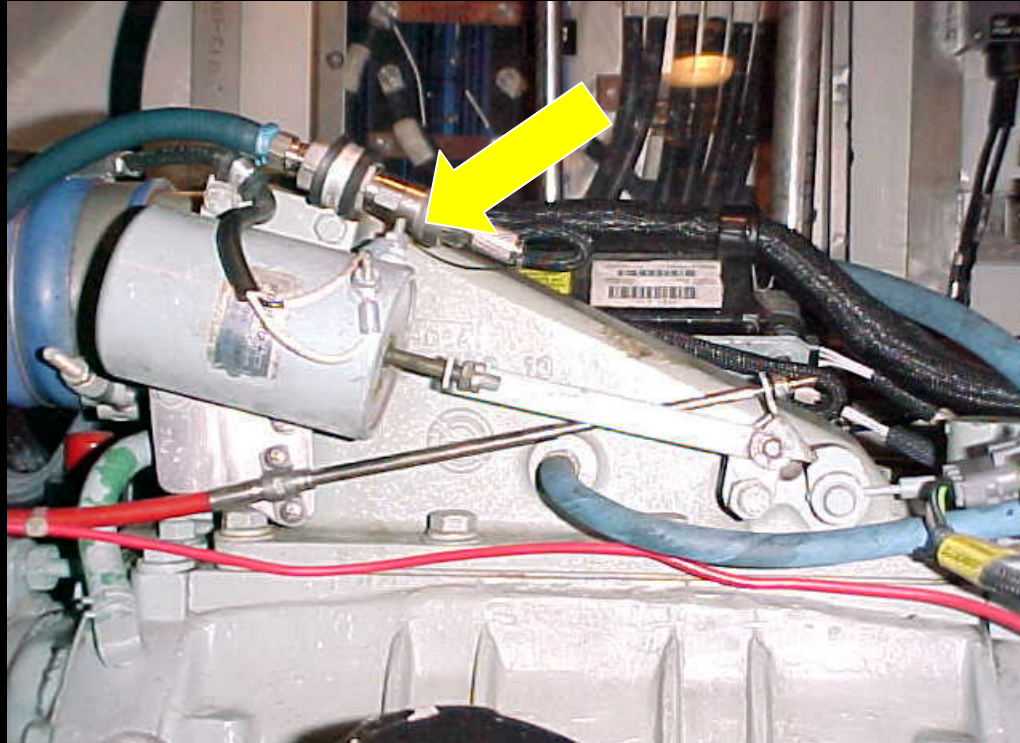
- ◆ Flashing red light used to warn personnel of eminent C02 discharge
- ◆ Located above engine room door

# C02 Engine Room Strobe Light



- ◆ Used to warn personnel of eminent CO2 discharge
- ◆ Located on Engine Room overhead

# Engine Shut-down Solenoids



- ◆ Used to secure engines prior to CO<sub>2</sub> discharge
- ◆ Located next to air inlet housing on top of engine

# C02 Siren

- ◆ Pneumatically operated
- ◆ Located on Engine Room Forward Bulkhead (5)



- ◆ Provides 30 seconds of discharge delay
- ◆ CO2 builds pressure in cylinder to eventually lift valve off seat
- ◆ Can be manually overridden by pulling handle on bottle

## Delay Cylinder

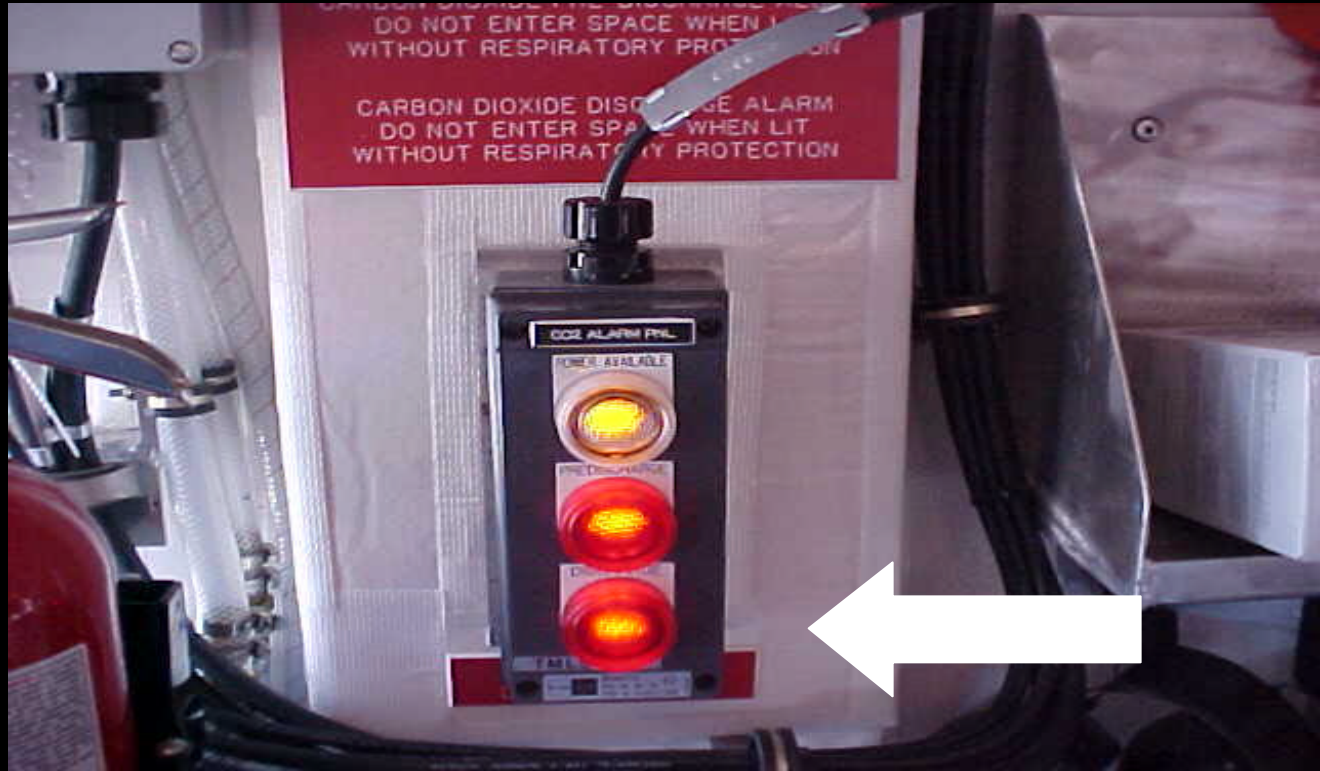


# Pressure Switch #2

- ◆ Electrically activates CO2 discharge light in Survivors' compartment (red)

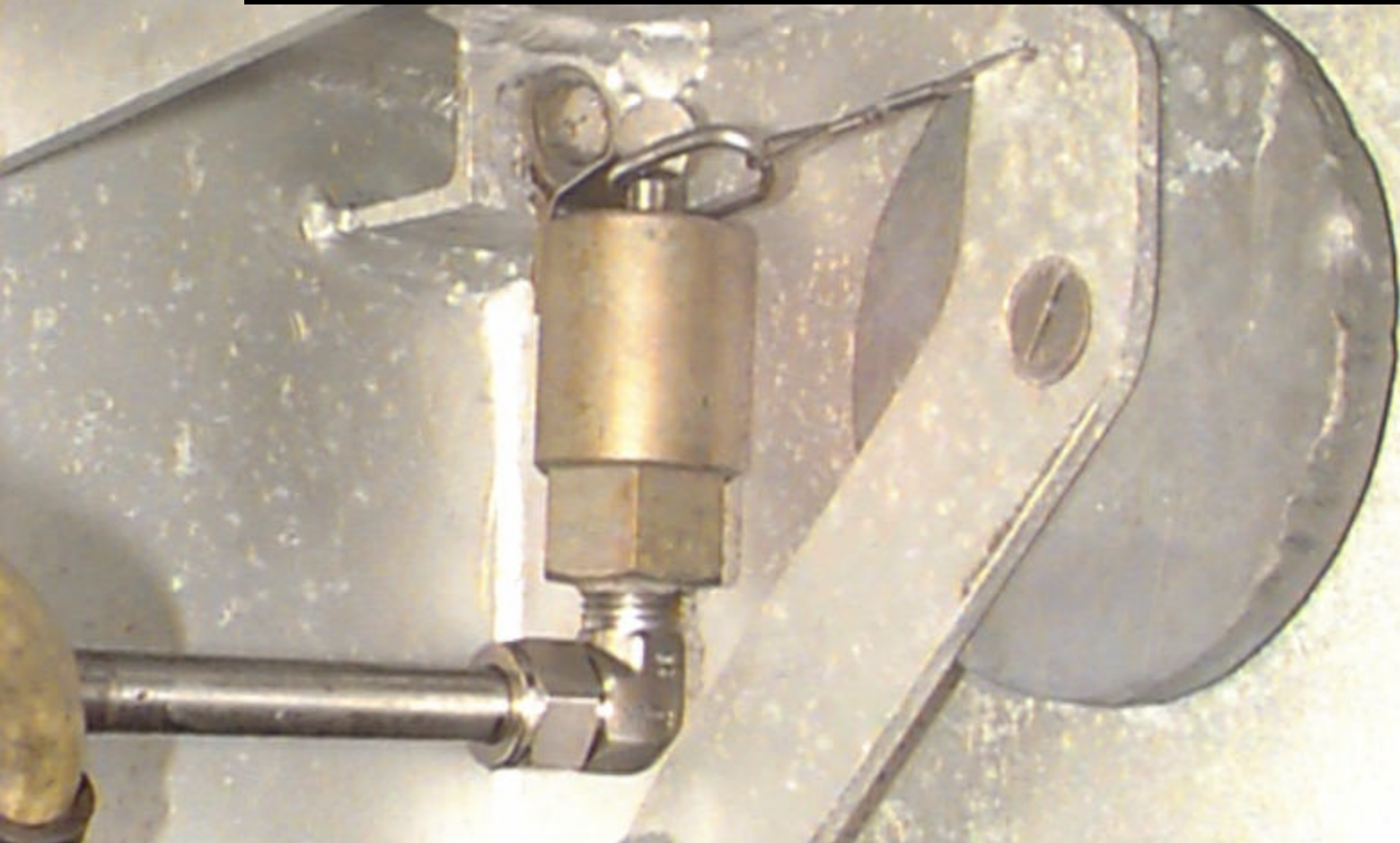


# C02 Engine Discharge Light



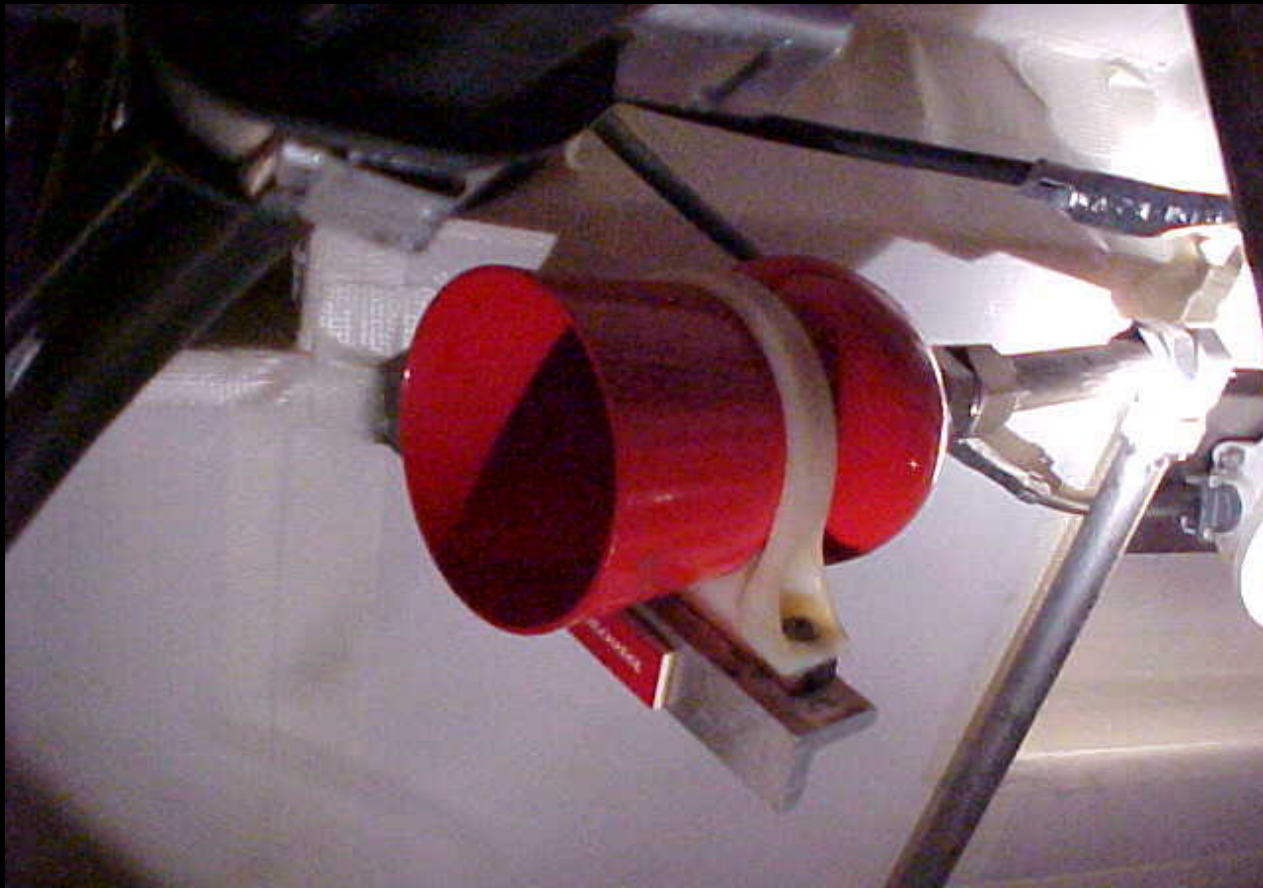
- ◆ Flashing red light used to warn personnel of eminent C02 discharge
- ◆ Located above Engine Room door

# Pressure Switch #3



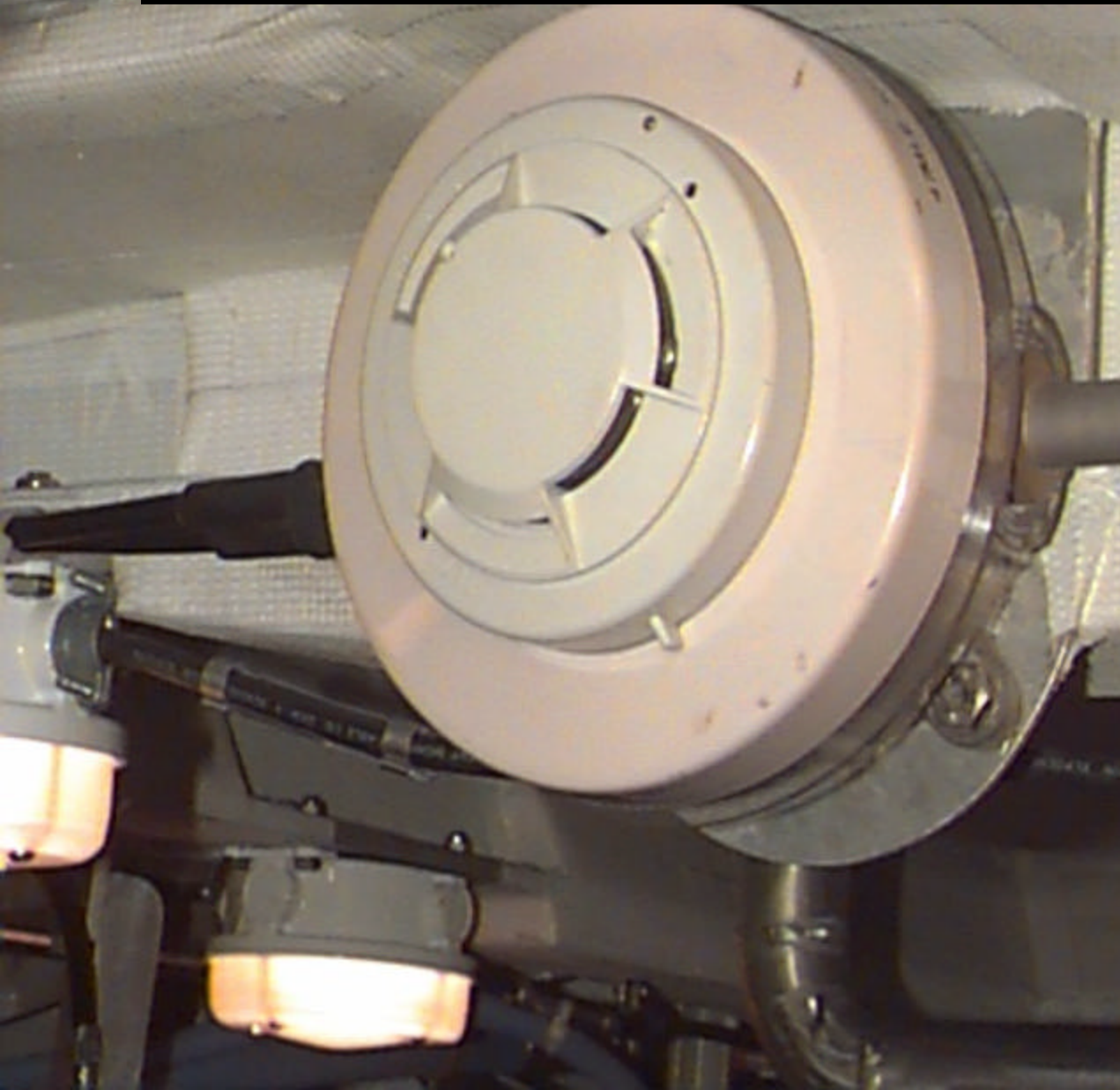
- ◆ Mechanically trips Engine Room air intake damper

# Multi-jet Discharge Nozzle



- ◆ Discharges CO<sub>2</sub> Into Engine Room

# Smoke/Heat Detector



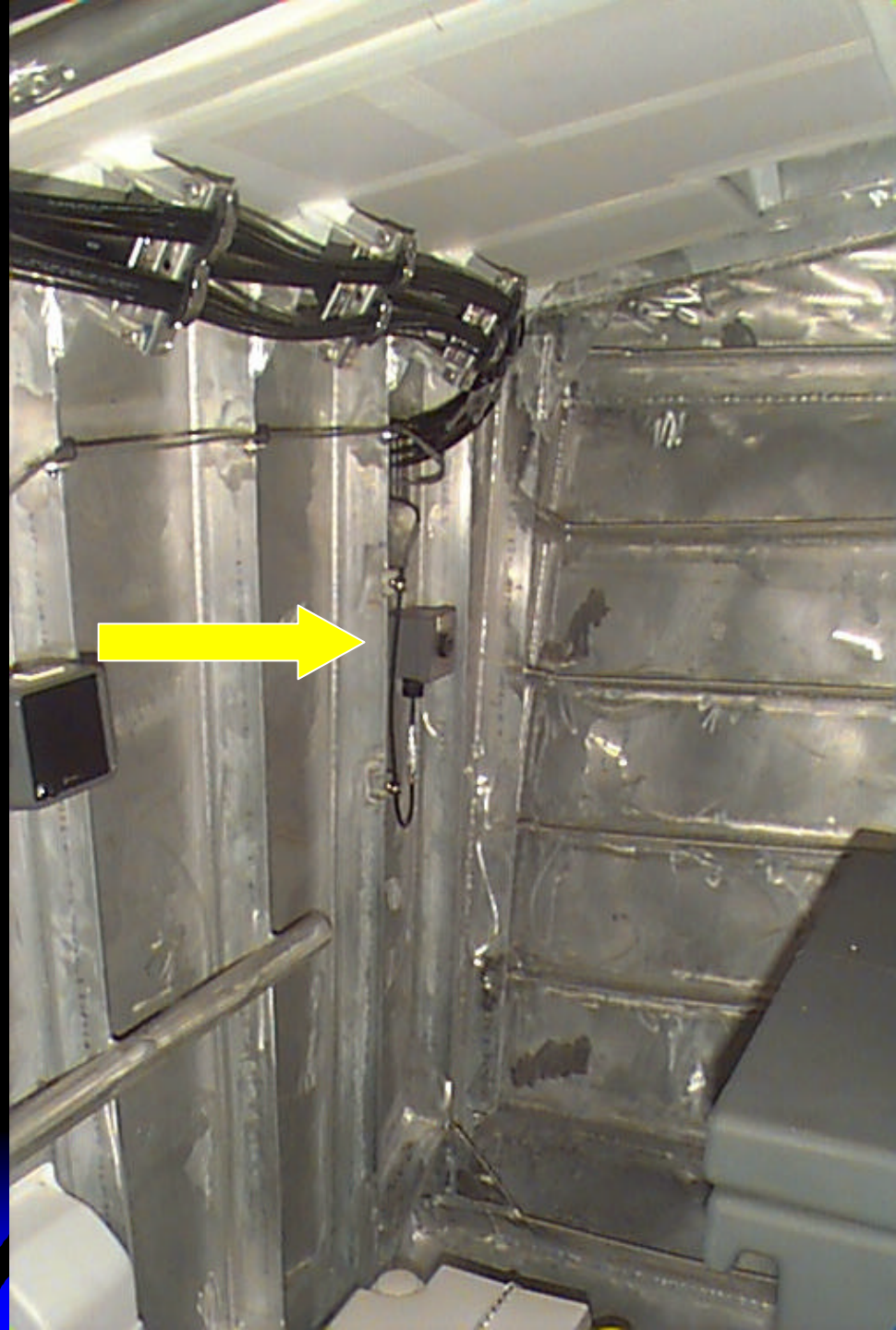
- ◆ Located on Engine Room overhead
- ◆ Alarm at 225 deg. F or smoke obscurity

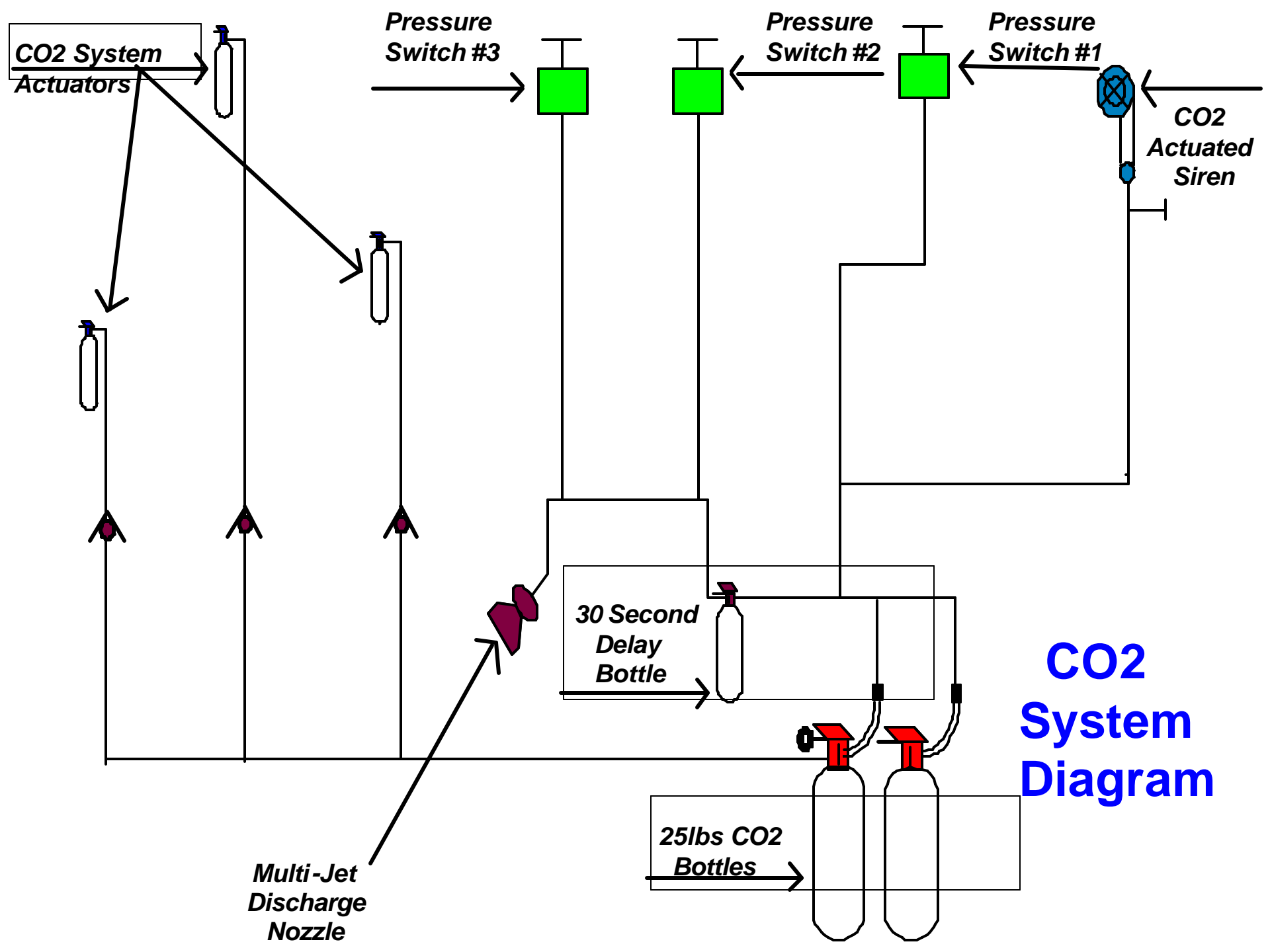
# Fire Alarm Indicator and Silence

- ◆ Located on:
  - Upper console in Enclosed Bridge
  - Center console on Open Bridge

# Fwd Compartment Alarm

- ◆ Alerts crewmembers that may be forward during a fire





# Electrical System



# System Components

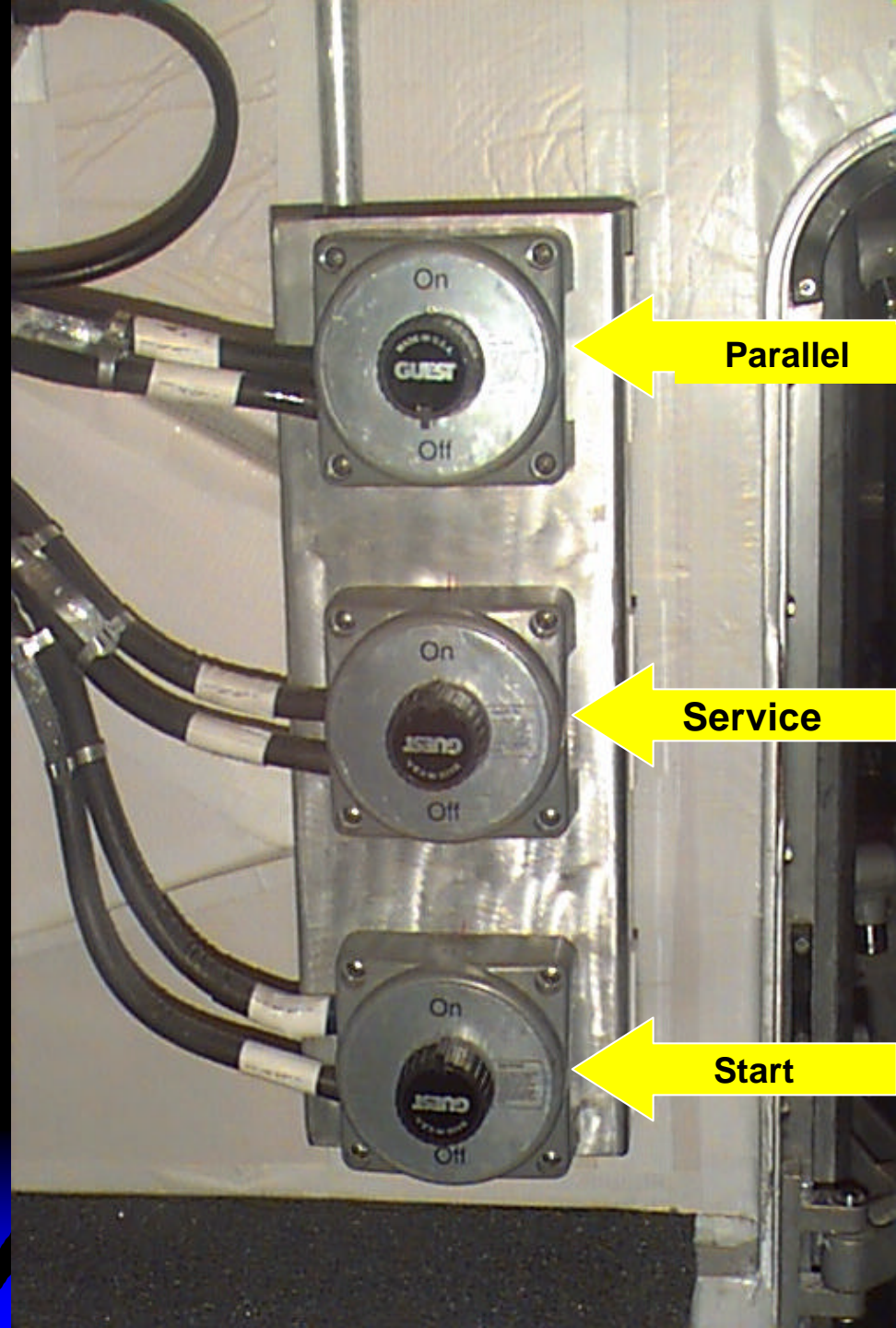
- ◆ Batteries
- ◆ Battery isolation switches
- ◆ Battery charger
- ◆ Alternators
- ◆ 24V DC panel
- ◆ 12V DC panel
- ◆ 12V power converter
- ◆ Shore tie
- ◆ Sea Power generators
- ◆ Sea Power user panel
- ◆ Sea power conversion units
- ◆ 120V AC panel

# Batteries

- ◆ Start system
- ◆ Service system
- ◆ Each system has 2 batteries connected in series
- ◆ Batteries are 12 volt gel-cell
- ◆ Maintenance free
- ◆ Batteries are located under grate in Aux. Mach. Space

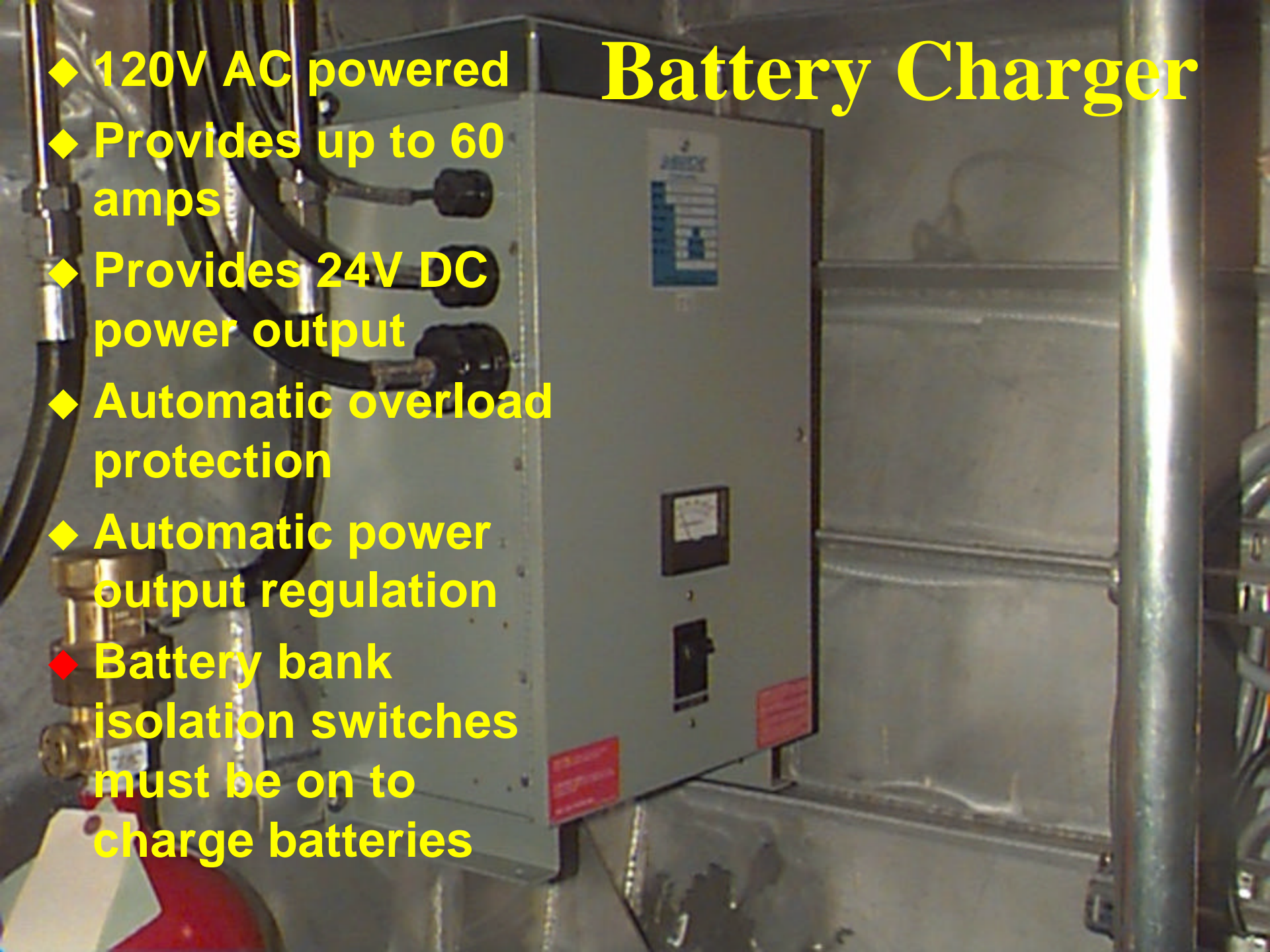
# Battery Isolation Switches

- ◆ Located in Survivors' Compartment
- ◆ Allow you to disconnect each bank of batteries
- ◆ Battery banks can be paralleled



# Battery Charger

- ◆ 120V AC powered
- ◆ Provides up to 60 amps
- ◆ Provides 24V DC power output
- ◆ Automatic overload protection
- ◆ Automatic power output regulation
- ◆ Battery bank isolation switches must be on to charge batteries



# Alternator



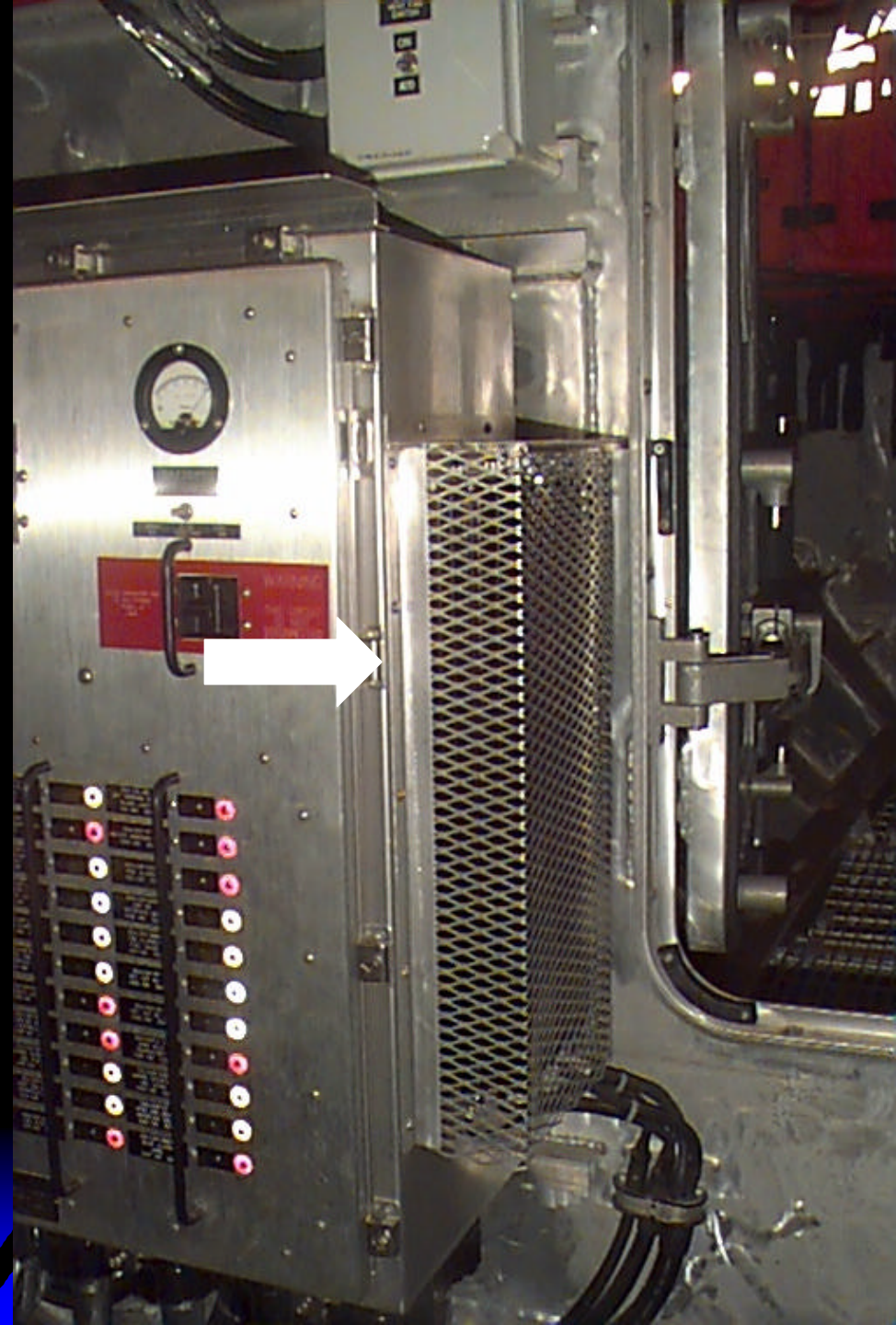
- ◆ Engine driven
- ◆ Delivers full output at idle speed
- ◆ Supplies power for:
  - Charging batteries
  - Lighting
  - Electronic & electrical equipment
- ◆ 25.5 volt    220 amp

# DC Power Panels

- ◆ 24V panel
- ◆ 12V panel
- ◆ All DC power is distributed through these panels
- ◆ Monitors voltage and amperage

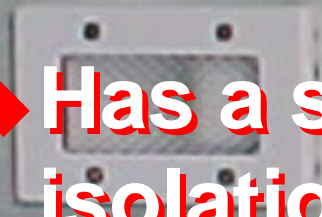
# 12 Volt Power Converter

- ◆ Mounted to 24V panel
- ◆ Power supply on 24V panel
- ◆ Power supply must be energized to use 12V panel



# Shore Tie

- ◆ Provides 100 amp protection
- ◆ Supplies power to AC system inport
- ◆ Has a separate circuit breaker and isolation transformer



# Sea Power Generator



- ◆ 5 KW generator
- ◆ Engine driven
- ◆ Supplies AC power to the HVAC system under way

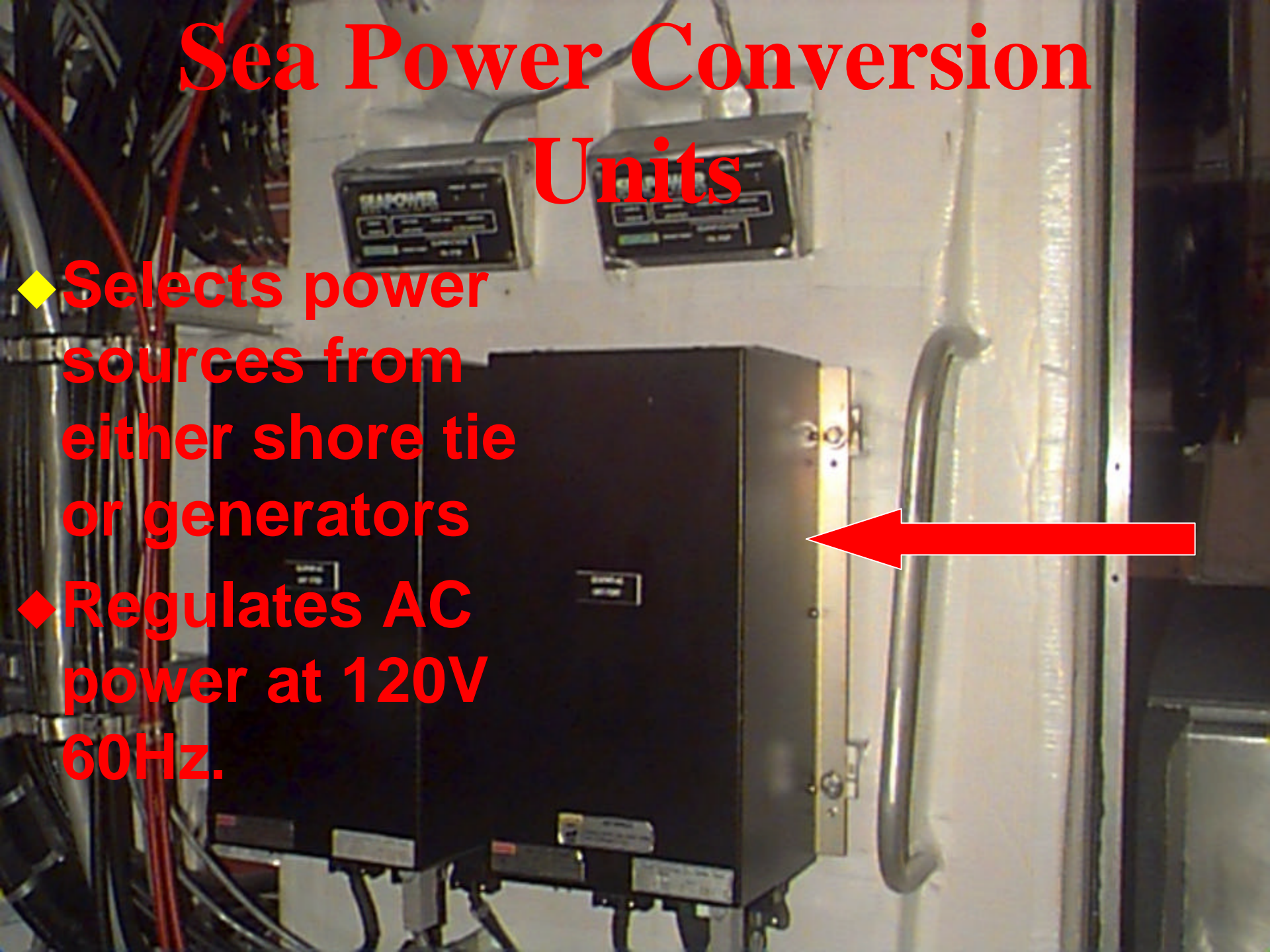
# Sea Power User Panel



- ◆ Located in Aux. Mach. Space
- ◆ Provides system information and power status

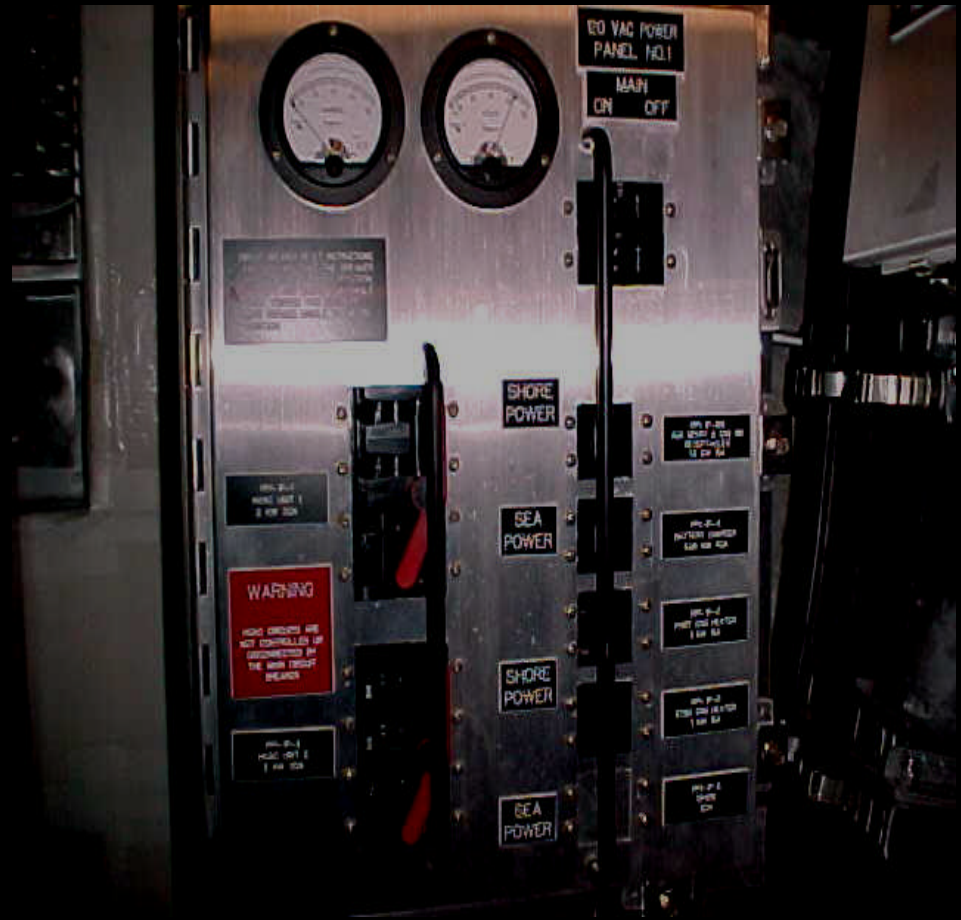
# Sea Power Conversion Units

- ◆ Selects power sources from either shore tie or generators
- ◆ Regulates AC power at 120V 60Hz.



# 120 VAC Panel

- ◆ Distributes power to the AC voltage system
- ◆ Interlocks on the shore power/sea power breakers
- ◆ Monitors voltage and amperage

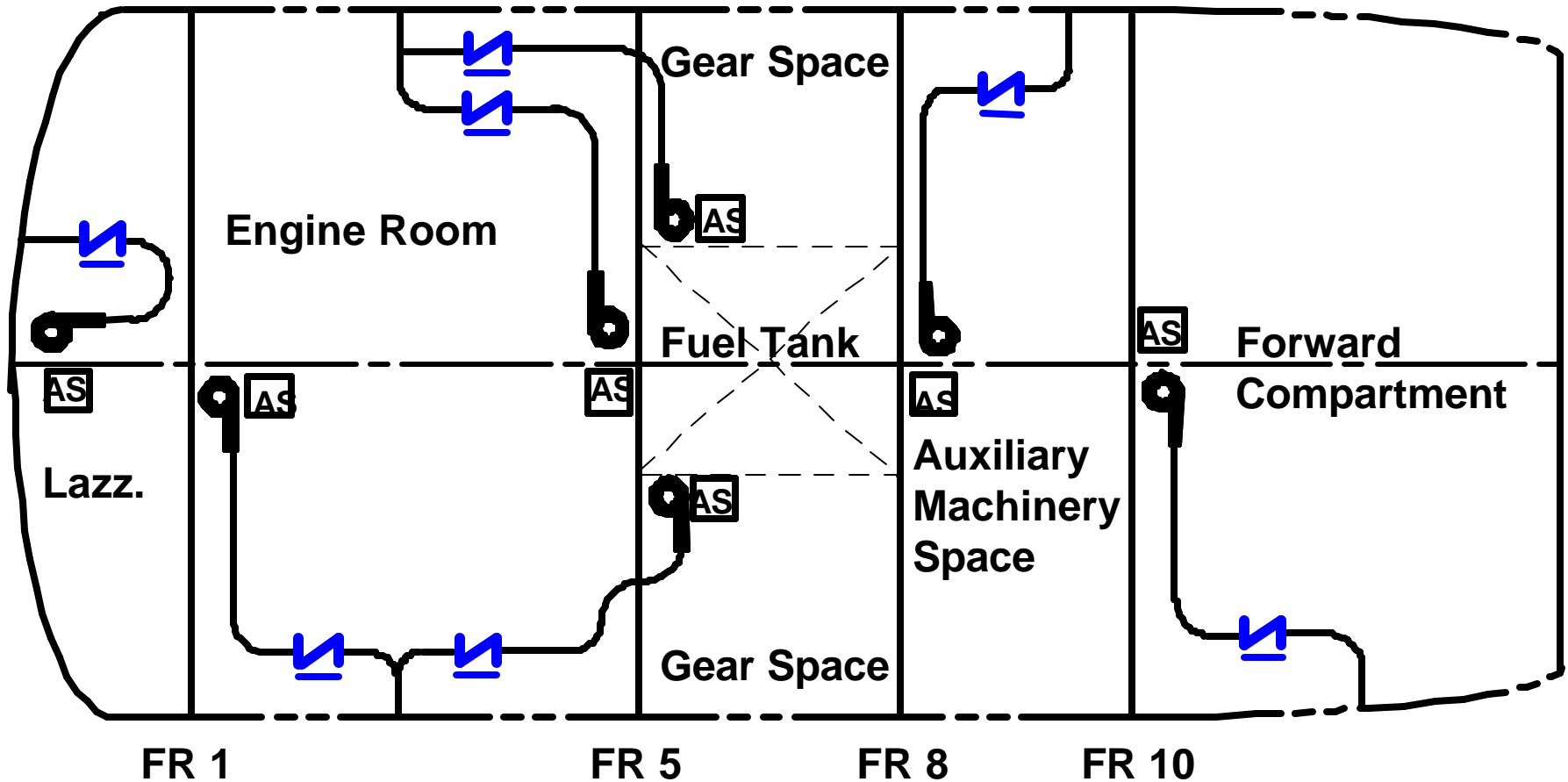


# Bilge Drainage System

Bilge Pump System

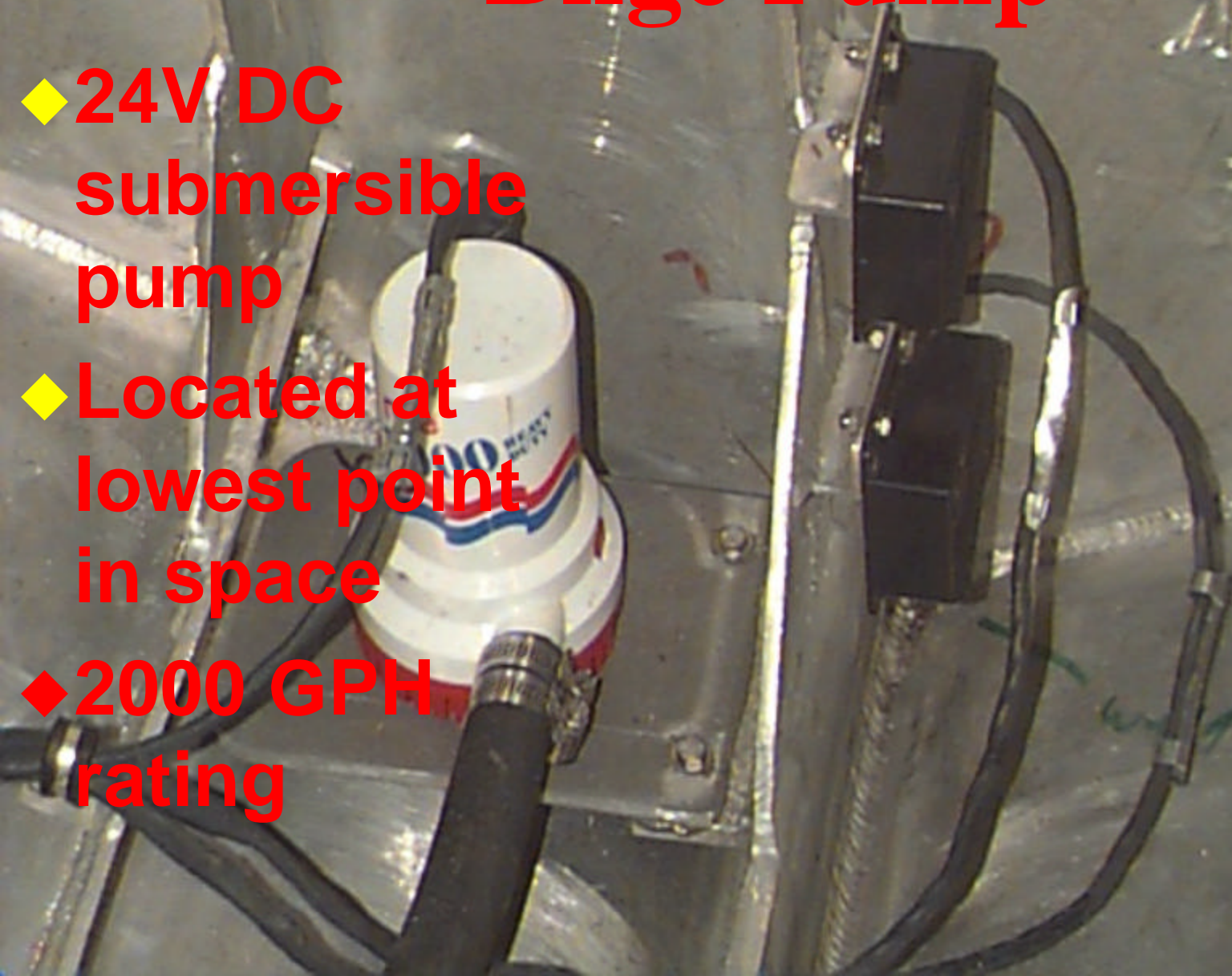
Engine Room Dewatering  
Standpipe

# Bilge Pump System



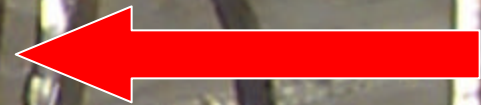
# Bilge Pump

- ◆ 24V DC submersible pump
- ◆ Located at lowest point in space
- ◆ 2000 GPH rating



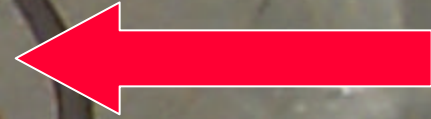
# Water Detector Switch

- ◆ Senses presence of liquid
- ◆ Illuminates light on alarm panel
- ◆ Audible alarm



# Automatic Pump Switch

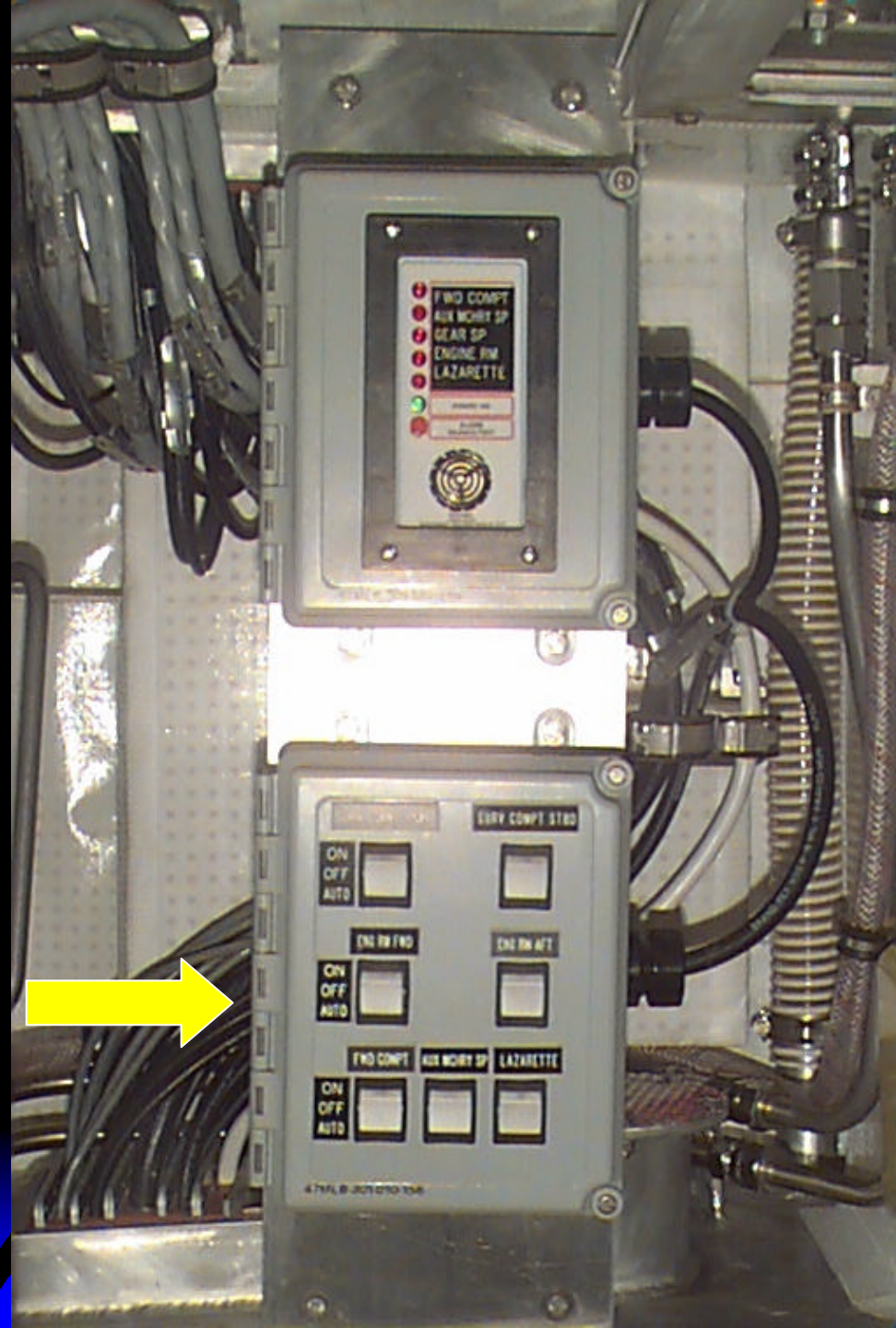
- ◆ Energizes pump when water is sensed
- ◆ Located approximately 6" above pump



# Control Panel

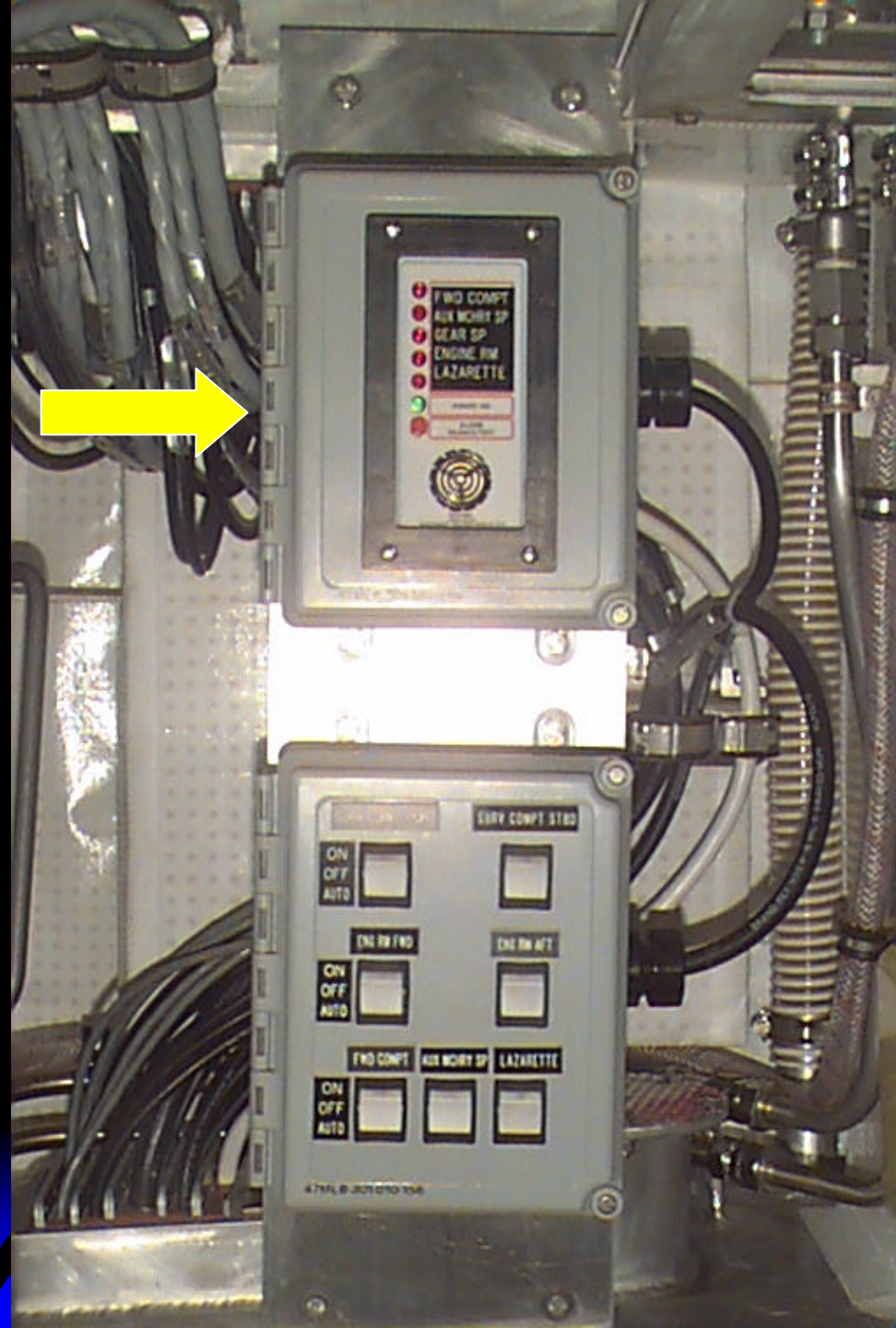
- ◆ Located on aft bulkhead starboard side of Enclosed Steering Station

- ◆ On/Off/Auto switches for each pump



# Alarm Panel

- ◆ Located above control panel
- ◆ Visual and audible alarm for each space
- ◆ System power light
- ◆ Alarm silence/test button



# Engine Room De-watering Standpipe

- ◆ Located between frames 1 and 2 in Engine Room Stbd of centerline
- ◆ Equipped with strainer
- ◆ Accessed on forward face of aft bouyancy chamber



# **Emergency Window Release System**



# EWRS Theory

- ◆ Two stationary windows, port and stbd, controlled by an electronic switch activated when water is sensed.
- ◆ The Emergency Window Release System (EWRS) is provided to allow free transfer of water through the compartment in the event of a damaged pilot house rollover.

# EWRS Components

- ◆ Compressor assembly
- ◆ Water sensor assembly
- ◆ Window latch assembly
- ◆ Window release test switch
- ◆ CO2 back-up actuator

# Compressor Assembly

- ◆ Located in Auxiliary Machinery Space
- ◆ Compressor assembly consist of:
  - Air compressor
  - Air reservoir
  - Solenoid valve
  - Pressure switch
  - Compressor run test switch

# Water Sensor



- ◆ Located in the Enclosed Bridge above side windows
- ◆ Operates on 12 volts DC
- ◆ Has a built in delay switch with a maximum delay of 3 seconds

# Window Latch

- ◆ One assembly for each window
- ◆ Each assembly contains:
  - ▣ Actuator cylinder
  - ▣ Pneumatic system reset switch
  - ▣ Two way valve



# Window Release Test Switch

- ◆ Located on stbd side window
- ◆ Used to test EWRS

# CO2 Back-up Actuator

- ◆ Located on overhead in Enclosed Bridge centerline
- ◆ Uses CO2 to operate actuator

# End of Vessel Systems

Questions?

